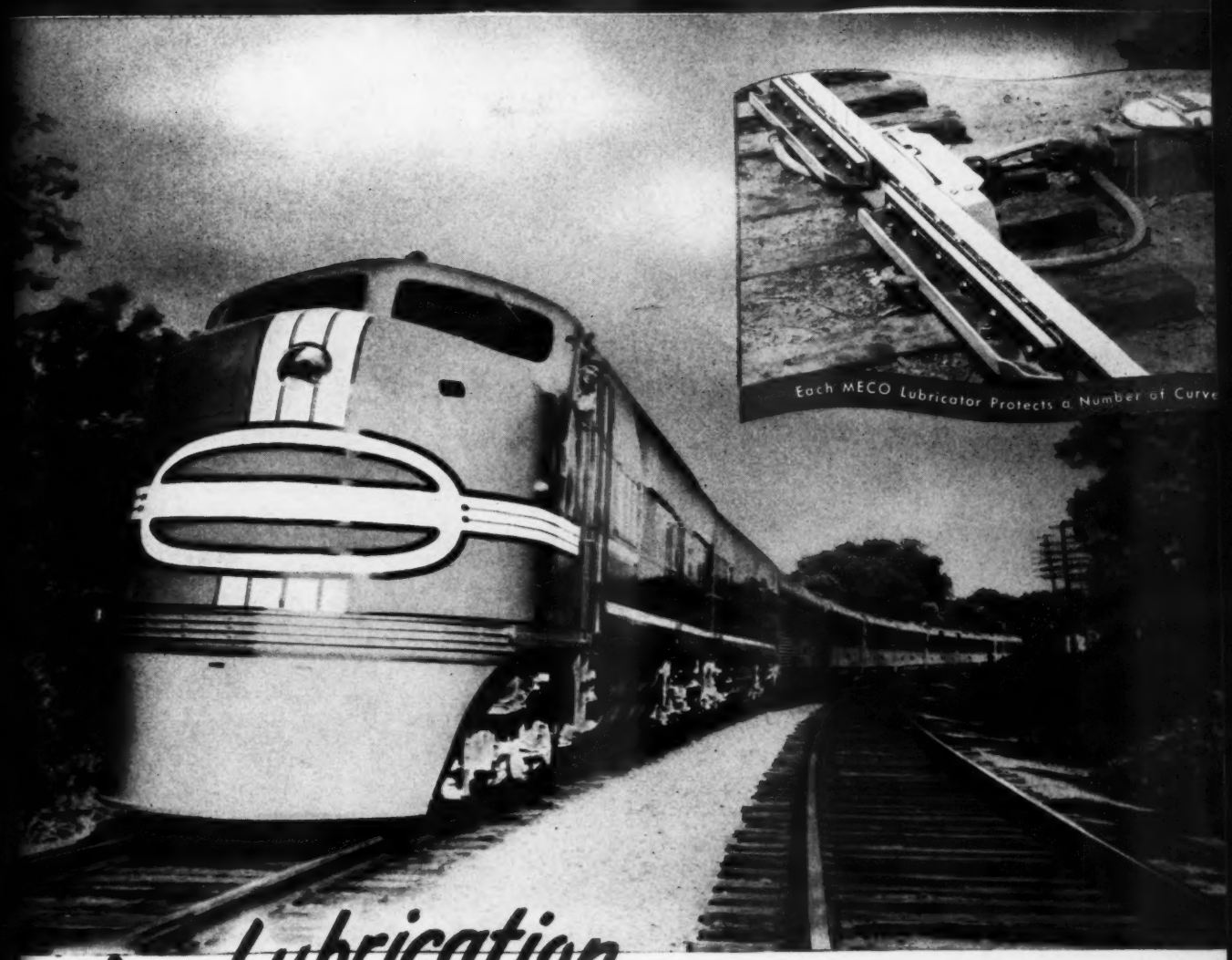
Railway Engineering and Maintenance

JUNE, 1946




MecoLubrication

TAKES THE CURSE OFF CURVES!

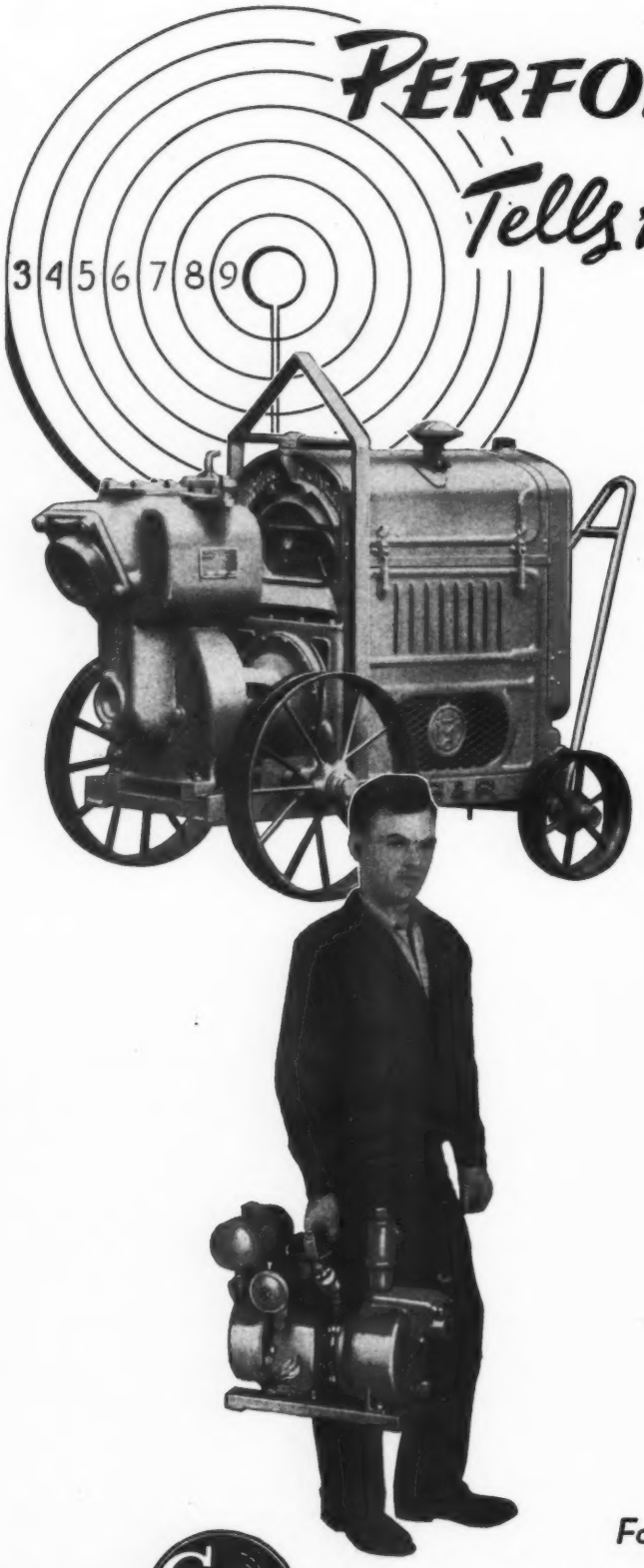
MECO LUBRICATORS increase curve safety for high speed trains, decrease curve rail friction, reduce wheel flange wear, and increase life of present and new curve rail 2 to 4 times.

ALSO—
Power Rail Layer—Requires No Train Orders.

Maintenance Equipment Company

# PERFORMANCE!

## Tells more than Words




For size of pump, for power consumed, for dollar invested, Gorman-Rupp pumps will out-perform any other pump. This is a "put up or shut up" proposition for we are willing to let you prove this for yourself by a free trial with no strings attached.

There is a Gorman-Rupp pump to fit any job. If you want a handy all purpose pump as easy to carry as a bag of tools, the sturdy little "Midget" will fill the bill. It will deliver as much as 3000 gallons per hour at continuous performance. If you have a heavy dewatering job that calls for as much as 125,000 gallons per hour get a Gorman-Rupp heavy duty model pump.
Gorman-Rupp self-priming centrifugal pumps never have to be shut down to be cleaned out -- there is no recirculation orifice to get plugged nor control valve to get jammed.

They are streamlined inside where streamlining counts.
Ask what you want of a Gorman-Rupp pump. Give it any kind of a test. Actual performance on the job will convince you.

*For details call your nearest distributor.*

**THE GORMAN-RUPP COMPANY**

GORMAN-RUPP PUMPS — UNSURPASSED FOR PUMPING FAST

332 N. BOWMAN STREET • MANSFIELD, OHIO

# The line is clear!

The Northwest Crawler Crane, Dragline or Shovel is particularly ideal on the line where traffic is heavy. With a Northwest work can progress rapidly and the line can remain clear.

Shoulder building, bank trimming, ditching, culvert work and often bridge construction or repair and widening can be handled while the line remains clear for high speed traffic.

There is no lost time for clearing a work train, no slowing of schedules and no loss of construction time in relocating each time the line is cleared.

Northwest crawler equipment can be put on the job quickly and easily. A Northwest can be loaded or unloaded on a standard flat car under its own power and without dismantling. It may be shipped over the highway by trailer or it can be had as rubber tired equipment. Northwests are serving every Class 1 Railway. They are proved in railway service. Ask for details. There is a capacity for every problem.

NORTHWEST ENGINEERING COMPANY
1713 Steger Bldg., 28 E. Jackson Blvd.,
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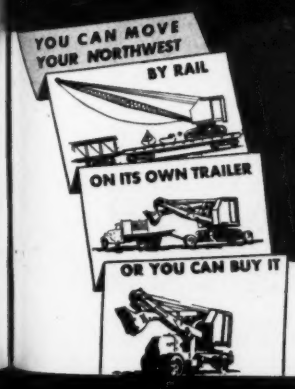


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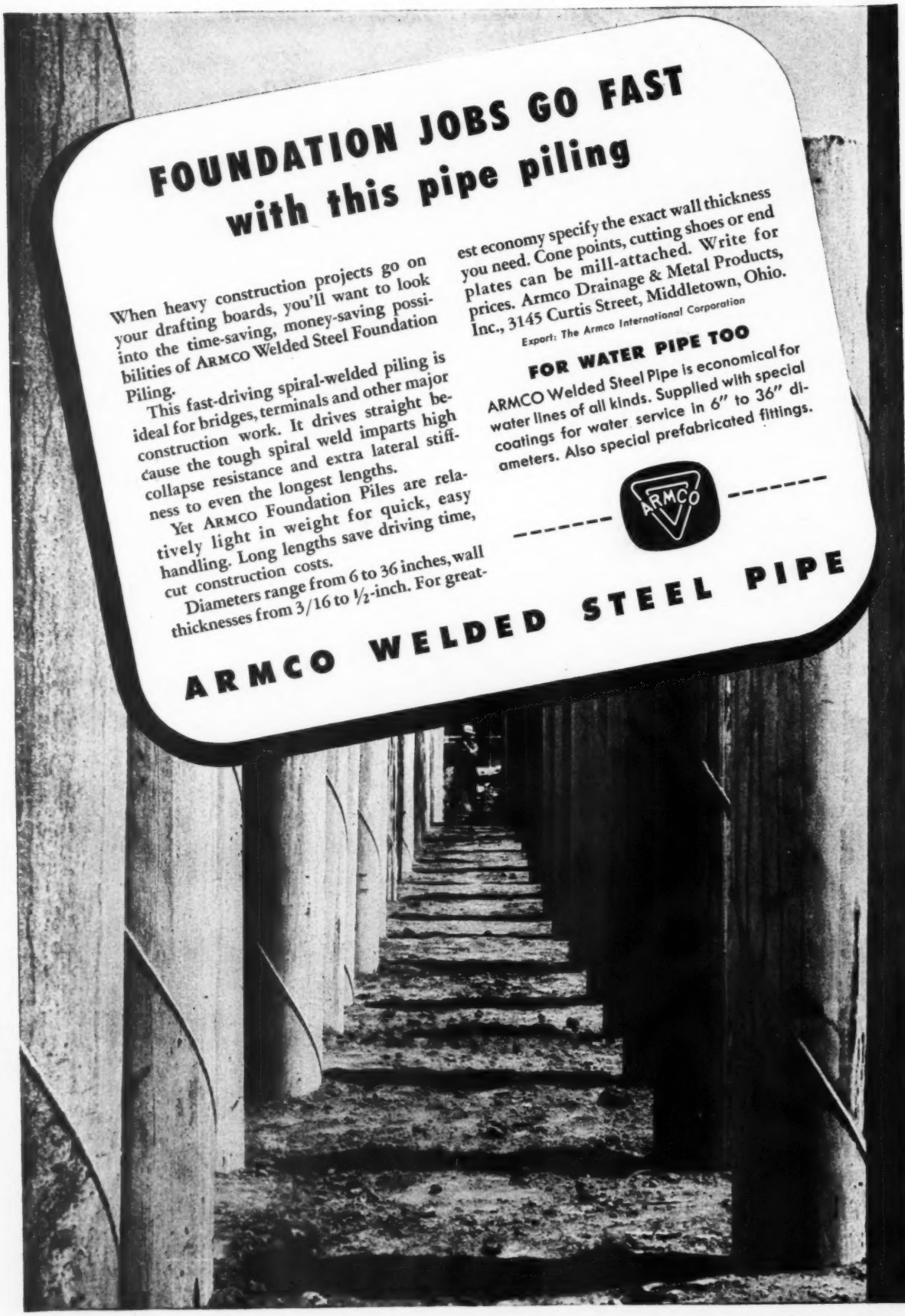
LEADING
RAILRO

NORTHWEST


FOUNDATION JOBS GO FAST
with this pipe piling
When heavy construction projects go on your drafting boards, you'll want to look into the time-saving, money-saving possibilities of ARMCO Welded Steel Foundation Piling.
This fast-driving spiral-welded piling is ideal for bridges, terminals and other major construction work. It drives straight because the tough spiral weld imparts high collapse resistance and extra lateral stiffness to even the longest lengths.
Yet ARMCO Foundation Piles are relatively light in weight for quick, easy handling. Long lengths save driving time, cut construction costs.
Diameters range from 6 to 36 inches, wall thicknesses from 3/16 to ½-inch. For greatest economy specify the exact wall thickness you need. Cone points, cutting shoes or end plates can be mill-attached. Write for prices. Armco Drainage & Metal Products, Inc., 3145 Curtis Street, Middletown, Ohio.
Export: The Armco International Corporation
FOR WATER PIPE TOO
ARMCO Welded Steel Pipe is economical for water lines of all kinds. Supplied with special coatings for water service in 6" to 36" diameters. Also special prefabricated fittings.
ARMCO
ARMCO WELDED STEEL PIPE

# DEVIL TOOLS

Years ago, Warren Tool Corporation went to work to develop heavy hand tools which would give longer and safer service. The tools had to have higher hardness, greater toughness, and more resistance to abrasion. A new line had to be manufactured and the first tool to be demonstrated to the railroads was the "Hack Devil Adz." This tool introduced a new trade name (DEVIL), and a new material for heavy hand tools . . . ELECTRIC FURNACE ALLOY TOOL STEEL.

The outstanding performance of the Hack Devil Adz soon gained an enviable reputation for safety and economy. Hence, the Slug Devil Spike Maul and the Cut Devil Track Chisel, made of electric furnace alloy tool steel, were soon developed for the trade. And today practically all railroad maintenance men recognize the economy and safety of the Devil Line which is complete.

An easy-to-use Warren Tool Catalog No. 10 and AREA Bulletin No. 4 give complete details on plans and specifications.

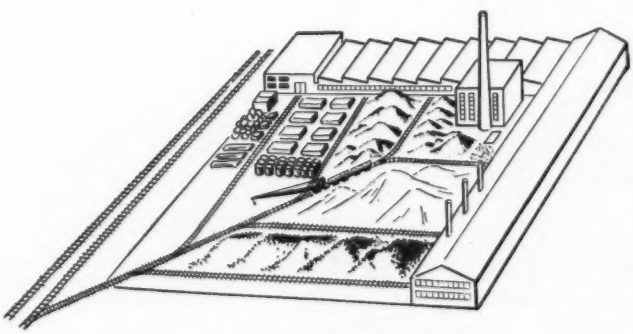
Write for your copies today.

WARREN TOOL CORP. · WARREN, OHIO

GENERAL SALES OFFICES: 105 WEST ADAMS STREET, CHICAGO 3, ILLINOIS PLANT: WARREN, OHIO

# New Salesman for Rail Service

The new "American" Diesel-Electric Locomotive Crane makes rail-served storage yards and stock piles more economical and convenient than ever before. This efficient all-purpose equipment makes it still more desirable for industrial concerns, large and small, to use the railroads, both for shipping in and shipping out. It is the perfect answer to the private switching problem — powerful, easily controlled, smooth starting, fast moving, sharp turning. It is a most flexible and durable materials-handler — easily changed from hook to bucket to magnet, and supplying current for the magnet. It piles high and wide and works safely inside buildings and out — is smoke and spark-free. Study all *your* storage requirements in the light of this new "streamliner of the storage yards." Individually designed diesel, gasoline and steam models are also available.



AMERICAN

**AMERICAN**

**HOIST & DERRICK CO.**

*St. Paul 1, Minnesota*

CHICAGO NEW YORK SAN FRANCISCO

REVOLVERS LOCOMOTIVE CRANES HOISTS DERRICKS BLOCKS AND SHEAVES CROSBY CLIPS

# *Red Lead* "PASSIVATES" METAL *Stifles Rust*

**Proven performance** through the years won for Red Lead its wide acceptance by industry as the standard paint for protecting metal.

**But it remained** for modern research to show the reasons *why* Red Lead is such an effective guardian against rust. One of the most important of these is Red Lead's ability to keep iron and steel in a "passive" state, in which rusting activity is reduced to a minimum.

**As is well known,** bare, unprotected steel exposed to moisture rapidly rusts.

**However,** the same steel protected by Red Lead remains in a "passivated" or rust-inhibited condition.

**This non-corroding** state of Red-Leaded steel, as compared with unprotected steel, can be measured electrically. See accompanying graph.

**It is worth noting** that, even after five years' exposure, the "passivating" power of Red Lead is still retained. No wonder, then, that Red Lead is considered the foremost paint for making metal *last*.

**Specify RED LEAD for All Metal Protective Paints**

The value of Red Lead as a rust preventive is most fully realized in a paint where it is the only pigment used. However, its rust-resistant properties are so pronounced that it also improves any multiple pigment paint. No matter what price you pay, you'll get a better metal paint if it contains Red Lead.

**Write for New Booklet**—"*Red Lead in Corrosion Resistant Paints*" is an up-to-date, authoritative guide for those responsible for specifying and formulating paint for structural iron and steel.


HYDROGEN REFERENCE
Negative Potential ← → Positive Potential
RED LEAD PANEL AFTER 5 YEARS' EXPOSURE
RED LEAD PANEL 10 DAYS OLD
BARE STEEL PLATE
10 20 30 40 50 60 70 80 90 100 110 120 130 140
TIME IN HOURS UNDER POTENTIAL MEASUREMENT TEST

**Scientific Proof of Red Lead's Protective Effect**

*In this test, a piece of unpainted steel was immersed in water. Iron, going into solution, reacted with oxygen in the water to form rust. This unrestrained corroding state is indicated by a rapidly developed and maintained negative potential relative to hydrogen (see above graph).*

*However, when steel panels painted with Red Lead were immersed under the same conditions, iron and lead salts formed directly next to the metal. This action at once stifled corrosion by preventing the iron from going into solution, thus keeping the steel surface passive. The result is shown in the graph curves above, where a quickly rising positive potential remains constant throughout the test.*

It describes in detail the scientific reasons why Red Lead gives superior protection. It also includes typical specification formulas . . . ranging from Red Lead-Linseed Oil paints to Red Lead-Mixed Pigment-Varnish types. If you haven't received your copy, address nearest branch listed below.

* * *

*The benefit of our extensive experience with Red Lead paints for both underwater and atmospheric use is available through our technical staff.*

**NATIONAL LEAD COMPANY:** New York 6; Buffalo 3; Chicago 80; Cincinnati 3; Cleveland 13; St. Louis 1; San Francisco 10; Boston 6, (National Lead Co. of Mass.); Philadelphia 7, (John T. Lewis & Bros. Co.); Pittsburgh 30, (National Lead Co. of Pa.); Charleston 25, W. Va. (Evans Lead Division).

**Dutch Boy**
Reg. U. S. Pat. Off.
**Red Lead**

**DIESELS ARE PARTICULAR**

**ABOUT THE WATER THEY DRINK!**

Unless feedwater for the flash-type heating boilers of a diesel engine is *pure,* a railroad may run into operating difficulties.

Minerals and other impurities in natural water supplies cause boiler-scale. Permutit* *removes* these impurities by means of a demineralizing process.

Today, on railroads where operating efficiency is notably high, Permutit Demineralizers are used to supply both diesel locomotives and roadside water plants with good feedwater for boilers.

Keep boiler water scientifically pure with modern Permutit Demineralizers. And find out about other water conditioning equipment developed by Permutit to improve operating efficiency wherever water is used along the right of way.

Write for information to The Permutit Company, Dept. RE-6, 330 West 42nd Street, New York 18, N. Y. or Permutit Co. of Canada, Ltd., Montreal.

*Trademark Reg. U. S. Pat. Off.

**PERMUTIT**

**WATER CONDITIONING HEADQUARTERS**

***Manufacturers of ALL types of water treatment equipment***

# Thew · LORAIN does it again!

## It's New

★ in Ideas
★ in Design
★ in Features
★ in Performance

### AND WE DO MEAN NEW!

**The TL-20 is the first really new "postwar" shovel and crane—not a delayed prewar unit, not a war-built unit—but new and up-to-the-minute from mounting to boom head.**

**True, all basic functions are the same. It hoists, swings, travels and crowds. But the *way* it does these jobs is entirely new—in engineering design, in power, speed and output.**

### A COMPLETE PACKAGE—NO EXTRAS!

**Each TL-20 is a complete package. All essential accessories—such as starter, generator, lights—are built into the standard unit. It's not a stripped-down unit; no "extras" to buy. It has the largest number of interchangeable parts ever built into a machine.**

### UNIT ASSEMBLY THROUGHOUT!

**Each major component—clutch shaft, engine, hoist shaft, cab, crawler propelling mechanism—can be removed and interchanged as a complete unit. The 5 clutches which control all machine operations have identical working parts and are also interchangeable—a vital factor in easy, low-cost service.**

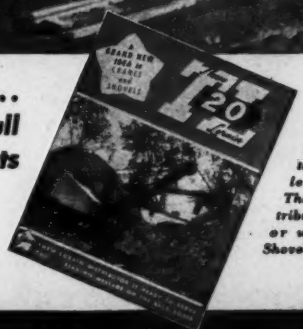
### YOUR CHOICE OF 10 MOUNTINGS—5 BOOMS!

**2-Speed Chain Drive Crawler and 9 Rubber-Tire Mountings (Moto-Crane and Self-Propelled types) on 4 or 6-wheel units, with or without front wheel drive.**

**5 Interchangeable Boom Assemblies for shovel, crane, clamshell, dragline or hoe operation.**

**Here's a real "Contractors' Machine"—a machine easy to understand, easy to service and maintain. See your nearest Thew-Lorain distributor now about the *postwar* TL-20—the newest thing in the ½ yd. class.**

**FREE... and full of facts**

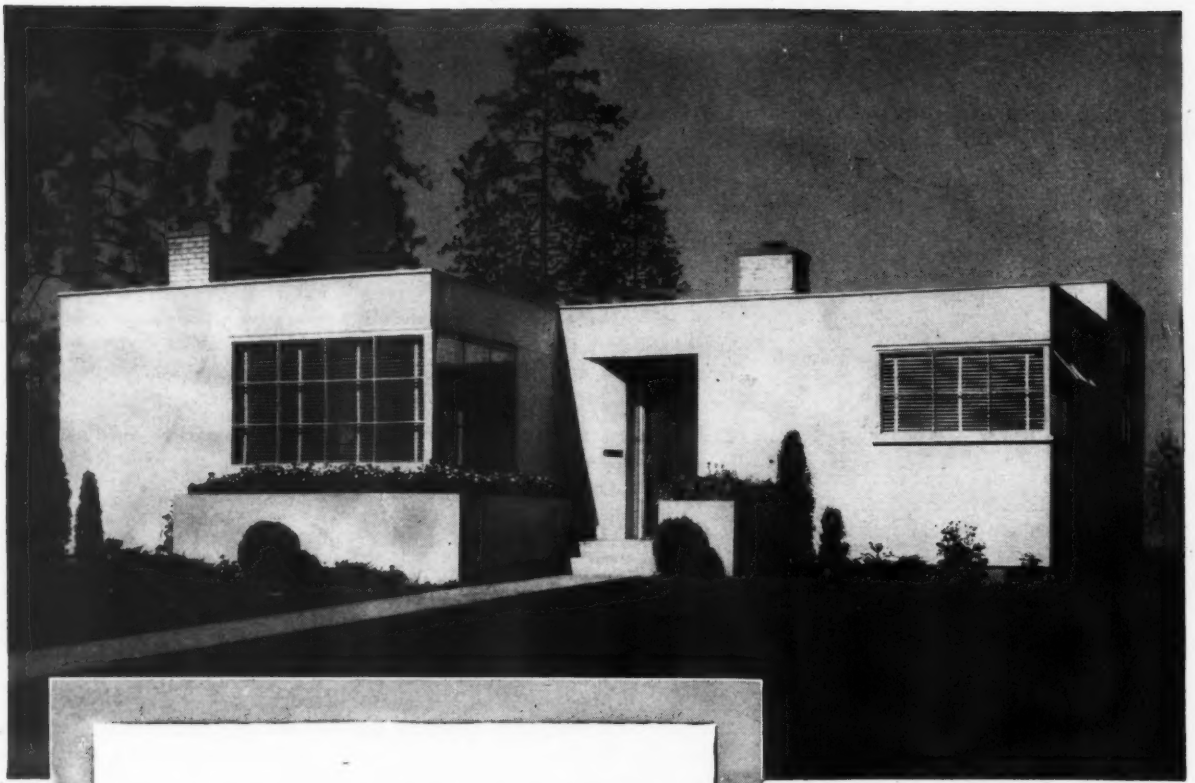



*The complete, illustrated story on the TL-20 is contained in this bulletin. Ask your Thew-Lorain distributor for a copy or write Thew Shovel Co. direct.*

**Thew TL 20 Lorain**

**THE THEW SHOVEL CO**
**LORAIN, OHIO**

**Available with 5 Interchangeable Booms and Choice of 10 Mountings**



# Douglas Fir Plywood Again Allocated

## -To Meet the Urgent Needs of the Reconversion Housing Program

TODAY'S most urgent and immediate need is for housing—and the Douglas fir plywood industry pledges complete cooperation with the Reconversion Housing Program.

The demand for housing requires that Douglas fir plywood again be put on an allocation basis. This means that a substantial proportion of the industry's production will be channelled to housing contractors, stock cabinet manufacturers, prefabricators and distributors.

As a result, the present supply situation for all other industrial and construction uses will be temporarily aggravated.

May we strongly urge you to anticipate your needs *far in advance*—and discuss your requirements with your regular sources of supply.

*Even though today the supply situation in Douglas fir plywood is critically short, for many projects such as forming concrete surfaces, for signs and display work, for boat building, and for many other industrial and commercial uses, it is almost indispensable. In these cases it is well worth waiting for, as it will save time and labor and do a better job.*

DOUGLAS FIR PLYWOOD
LARGE, LIGHT, STRONG,
Real Wood
PANELS

**Douglas Fir Plywood Association**
Tacoma 2, Washington

# "Yes, Flintkote Products protect all along the line"

***"Flintkote asphalt shingles and sidings have certainly improved the appearance of this station. What's more, they protect the building, too... enable it to take the punishment of heat, rain, and coal dust."***

***"And speaking of protection, Flintkote Car Cements are also doing a great job keeping this Company's rolling stock shielded against abrasion and corrosion."***

Yes, all along the line, Flintkote materials are protecting property . . . saving millions of dollars for many railroads.

Flintkote Car Cements protect vulnerable spots such as end posts . . . under frames . . . slope sheets . . . and couplers.

This tough, asphalt-base compound will safeguard your equipment from the attacks of acids, corrosive fumes, and flying cinders. It will protect your rolling stock against abrasion and corrosion and keep it rolling for additional thousands of miles of trouble-free service.

You'll find that Flintkote Car Cements are quickly and easily applied. Made in consistencies for brush, spray, or trowel.

Ask about the many other Flintkote products which are now available to aid railroad maintenance . . . to facilitate new construction. These include Flooring Emulsions for Cold Mastic Flooring, Insulation Coatings, Waterproofing and Damproofing Materials as well as Roofings, Sidings and Insulation products.

Write for free pamphlets on these products.

## Flintkote-Products for Industry

**THE FLINTKOTE COMPANY · INDUSTRIAL PRODUCTS DIVISION**

Atlanta · Boston · Chicago Heights · Detroit · Houston

FLINTKOTE INDUSTRIAL PRODUCTS

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Southern Railway System

*Your* specialized LeTourneau Railroad Distributor was selected because (1) he and his men are experts on dirtmoving and material handling equipment as applied to railroad construction and maintenance . . . (2) he has competent factory-trained and field-experienced mechanics ready to give high quality and dependable service on your railroad construction equipment . . . (3) because he has large shops and stockrooms, carries adequate supplies of LeTourneau parts to promptly service any old or new equipment.

You will find his whole organization friendly, courteous, ready to talk your business in your language. His men will be glad to cooperate in contributing ideas from their extensive dirtmoving experience wherever it will be helpful.

He is prepared to assist you in estimating output and costs, help you find skilled operators for any of your dirtmoving equipment, offer suggestions to improve job efficiency with your existing equipment, recommend dirtmoving contractors for grading you

## • MONTGOMERY, *Alabama*
**Miller G. Williams Machy. Co.**
***Foot of Coosa Street***

Gulf, Mobile & Ohio R. R. Co.
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Tournapulls * Tournacranes * Tournatrailers * Tournatrucks *

# RAILROAD *Distributors . . .*

do not care to handle with your own organization.

Because a single distributor handles sales and service for your entire line, there are no jurisdictional disputes, no buck passing when equipment is moved from one division to another. Your LeTourneau Distributor is not a broker, he combines all functions of sales and service, is prepared to back up his equipment with fair dealing and prompt service, regardless of where you use it.

Make a note now of YOUR LeTourneau Distributor . . . call on him whenever you have construction or maintenance dirtmoving problems or when you need off-track lifting or hauling units. He'll be glad to give you complete cooperation; honest, straightforward answers; the full benefit of his extensive experience. He's at your service.

***R. G. LeTourneau, Inc.***
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Union Pacific Railroad

**Additional LeTourneau Railroad Distributors will be announced in this publication. Watch for them.**

*LeTourneau* products include TOURNAROPE* and TOURNAWELD*, specially engineered wire rope and welding rod, made by LeTourneau to give improved service on dirtmoving equipment.

Carryall * Scrapers | Dozers | Rooters * | Sheep's Foot Rollers | Power Control Units

* Trade Mark Reg. U.S.

## . . . the roofing "specs" you need are in this New, Simplified Book

Now, when you want any type of built-up roofing specification . . . smooth-surfaced or gravel-surfaced . . . you can simply copy it from the new, revised Johns-Manville Specification Manual.

Clear, concise, and up-to-date, based on Johns-Manville's 88 years of roofing experience, this Manual is organized to give you in the quickest possible way a complete roofing specification for any type of deck—wood, steel, concrete, or gypsum.

In addition, the book gives complete flashing specifications and detailed drawings of various flashing methods. It specifies how roof insulation should be applied. *It tells why a J-M Flexstone Roof made of asbestos felts—fireproof, rotproof, smooth-surfaced and unaffected by the sun—deserves your careful consideration.*

We cordially invite you to send for your copy. There's no obligation, of course.

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Without obligation, please send me a copy of the J-M Specification Manual on Built-Up Roofs.

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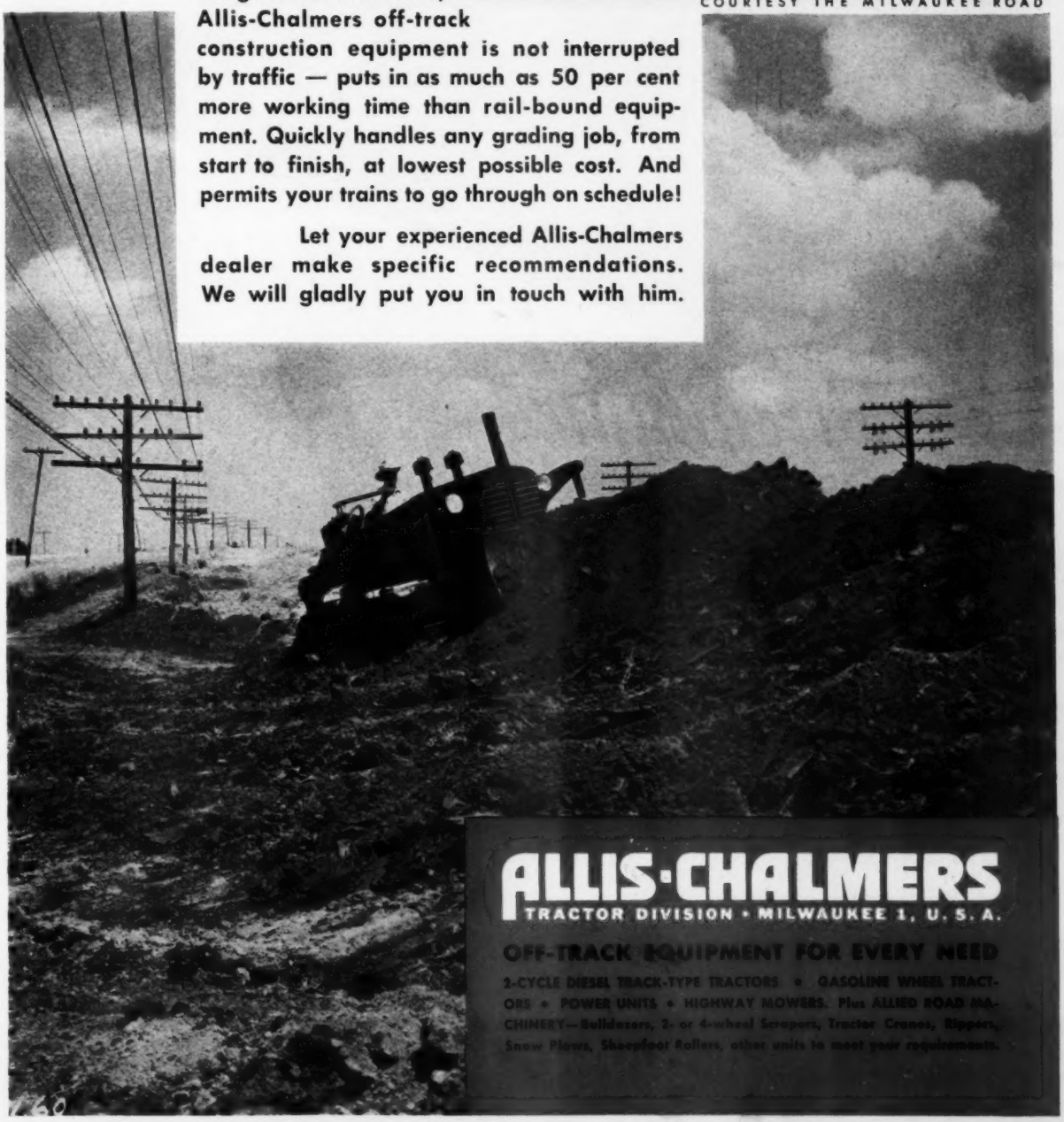
***88 YEARS OF SERVICE TO TRANSPORTATION***

# *FASTER* ROADBED MAINTENANCE FOR *FASTER* RUNS

COURTESY THE MILWAUKEE ROAD

Eliminate concern as to whether you can keep up with roadbed maintenance as faster and even faster trains zip over the rails. Operating free of the tracks, Allis-Chalmers off-track construction equipment is not interrupted by traffic — puts in as much as 50 per cent more working time than rail-bound equipment. Quickly handles any grading job, from start to finish, at lowest possible cost. And permits your trains to go through on schedule!

Let your experienced Allis-Chalmers dealer make specific recommendations. We will gladly put you in touch with him.



**ALLIS-CHALMERS**

TRACTOR DIVISION • MILWAUKEE 1, U. S. A.

**OFF-TRACK EQUIPMENT FOR EVERY NEED**

2-CYCLE DIESEL TRACK-TYPE TRACTORS • GASOLINE WHEEL TRACTORS • POWER UNITS • HIGHWAY MOWERS. Plus ALLIED ROAD MACHINERY—Bulldozers, 2- or 4-wheel Scrapers, Tractor Cranes, Rippers, Snow Plows, Sheepfoot Rollers, other units to meet your requirements.

# Streamlined

## POWER ON RAILS

The world's most powerful single-unit diesel-electric locomotive . . . 3000 h.p.

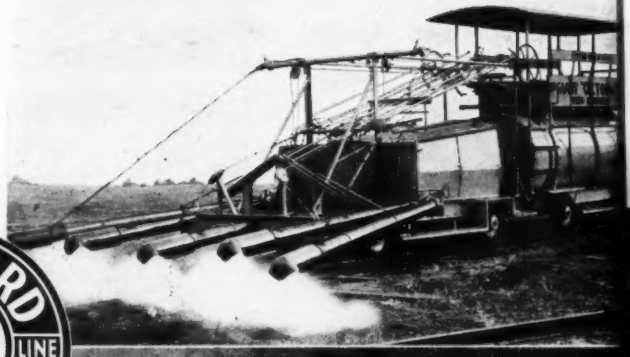
*requires*

# Streamlined

## ROADBED MAINTENANCE

As the modern most powerful single-unit diesel-electric locomotive . . . 3000-H.P. sets new standards for heavy duty motive power, so do Woolery Weed Burners typify the most modern and efficient method of maintaining clean, weed-free tracks with all their advantages of cleaner ballast, better drainage and reduced tie-decay.

SEABOARD AIR LINE RAILWAY — THROUGH THE HEART OF THE SOUTH



Woolery Weed Burners are demonstrating daily in actual service on more than 75 railroads their dependability of operation and their ability to destroy vegetation quickly, efficiently and economically, with a minimum requirement of time and manpower.

**WOOLERY WEED BURNERS**

**Available in 5-burner, 3-burner, 2-burner, and 1-burner models.**

# WOOLERY MACHINE COMPANY

MINNEAPOLIS — Pioneer Manufacturers of — MINNESOTA

RAILWAY MAINTENANCE EQUIPMENT

RAILWAY WEED BURNERS . MOTOR CARS . TIE CUTTERS . TIE SCORING MACHINES . RAIL JOINT OILERS . CREOSOTE SPRAYERS . BOLT TIGHTENERS

# New life for BATTERED RAILS

**Rail-ends rebuilt with OXWELD MW rod last 50 to 100 per cent longer in first position. This specially developed rod provides hardness, abrasion resistance, and high tensile strength... more batter-resistance than the original rail. Ask Oxweld for more information.**

The word "Oxweld" and the designation "MW" are registered trade-marks.

THE OXWELD RAILROAD SERVICE COMPANY
*Unit of Union Carbide and Carbon Corporation*
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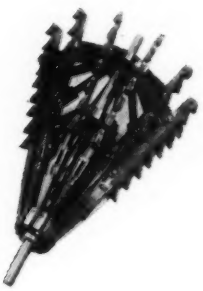
Carbide and Carbon Building Chicago and New York

OXWELD RAILROAD SERVICE

*And Now . . . A New*

# Sign of Satisfaction

PC



● P for Pipes, Sewers, Conduits, and all your drainage Problems . . . C for CLEAN—PC has come into its own rightful heritage. Like the sterling stamp on silver, you'll find this sign stands for complete satisfaction in Contract Pipe Cleaning Service. Insist upon PC!

—**PIPE CLEANING** means just this . . . getting ALL the lumber, rocks and rubble out of the sewer . . . all this dirt and hard, rocky boiler wash deposit was taken from a 710' section of 24" sewer at C. B. & Q. R.R's Creston, Iowa, yards.

**HYDRAULIC and MECHANICAL**

Cleaning—with performance-tested equipment designed by our own engineers for your particular type of work—and years of "know how" that's carried right through to the end of the job—makes PC the BEST Cleaning Service available. And it costs less, too!

**PITTSBURGH**

**PIPE CLEANER COMPANY**

**Dept. A**
**133 DAHLEM ST.**
**PITTSBURGH (6), PA.**

**WRITE NOW**—find out how PC Contract Service fits your cleaning needs. Drop a card or note to Pittsburgh Pipe Cleaner Co., Dept. A, 133 Dahlem St., Pittsburgh (6) Pa., or any of our

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in Pittsburgh, Philadelphia, Baltimore, Washington, New York, Buffalo, Chicago, Cincinnati, St. Louis, Detroit, Bethlehem or Boston.

# HOLE DIGGER . . .

# POLE SETTER . . .

# WIRE STRINGER . . .

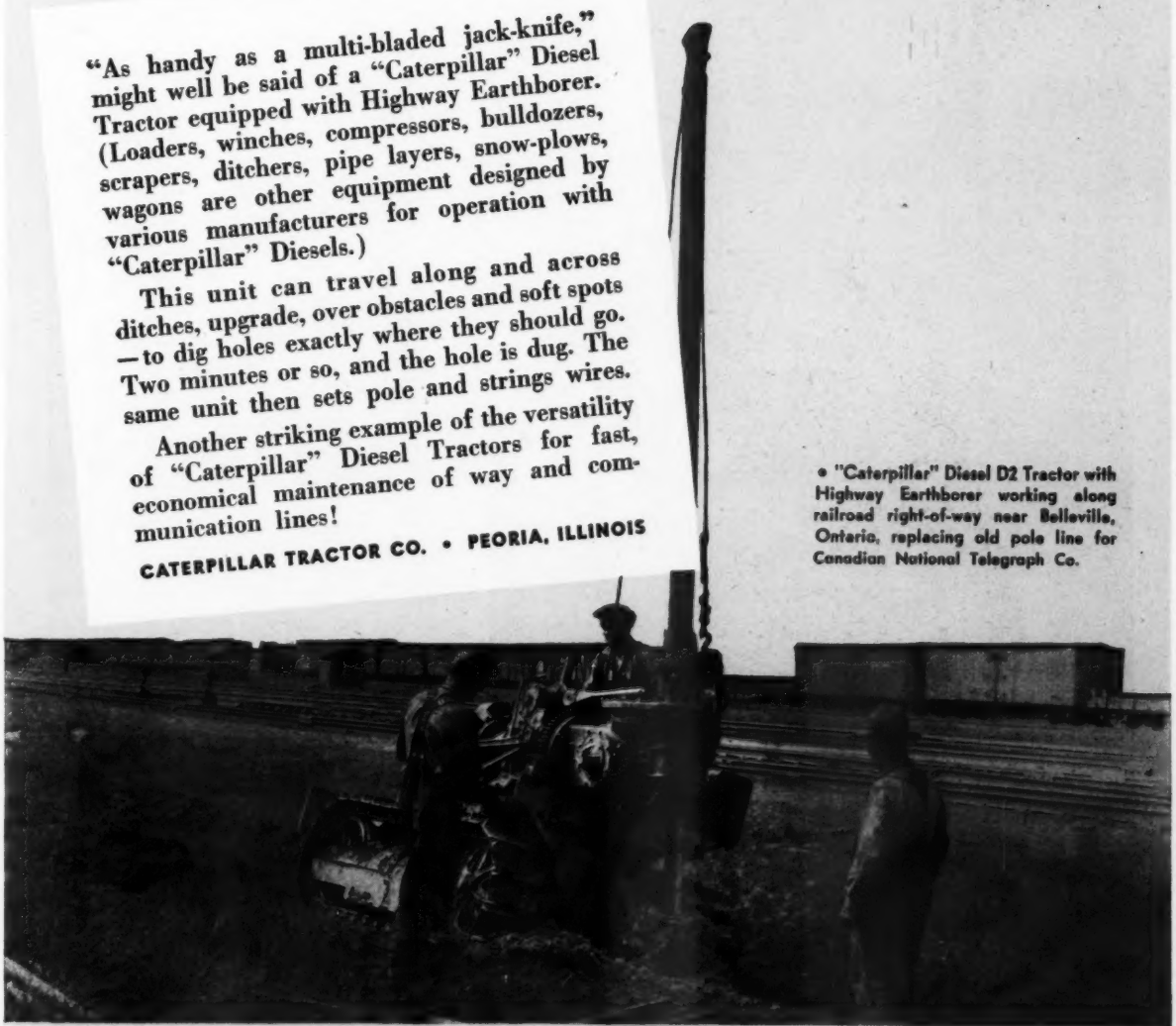
# ALL IN ONE!

"As handy as a multi-bladed jack-knife," might well be said of a "Caterpillar" Diesel Tractor equipped with Highway Earthborer. (Loaders, winches, compressors, bulldozers, scrapers, ditchers, pipe layers, snow-plows, wagons are other equipment designed by various manufacturers for operation with "Caterpillar" Diesels.)

This unit can travel along and across ditches, upgrade, over obstacles and soft spots —to dig holes exactly where they should go. Two minutes or so, and the hole is dug. The same unit then sets pole and strings wires.

Another striking example of the versatility of "Caterpillar" Diesel Tractors for fast, economical maintenance of way and communication lines!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS



• "Caterpillar" Diesel D2 Tractor with Highway Earthborer working along railroad right-of-way near Belleville, Ontario, replacing old pole line for Canadian National Telegraph Co.

# CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

# *Off-Track Work*

## IS FASTER - CHEAPER *with*

# MICHIGAN

## *Mobile* SHOVELS - CRANES

Find out how MICHIGAN Mobile SHOVEL-CRANES can get your jobs done in shortest possible time at lowest cost—write today for Bulletin RE-66.

**Work proceeds at greater speed with less delay to the job and to traffic. Time often wasted by ordinary equipment while awaiting passage of trains becomes *working time* when MICHIGAN Mobile SHOVEL-CRANE is on the job. This up-to-the-minute rubber-tired off-track equipment saves valuable time and manpower, reduces costs on a wide range of construction, maintenance and materials-handling jobs . . .**

**3/8 YARD AND 1/2 YARD • FULLY CONVERTIBLE**
**FINGERTIP AIR CONTROLLED CLUTCHES • ONE-MAN OPERATION**

# MICHIGAN

POWER SHOVEL COMPANY

BENTON HARBOR, MICHIGAN

THE newly developed Nordberg Spike Hammer now affords a fast, money saving, easy method for driving spikes. It is the fifth rail laying operation which Nordberg has successfully mechanized:— *spike pulling — tie adzing — rail drilling — joint tightening* and now *spike driving*. This machine is just as revolutionary in its performance as the other four Nordberg machines used for rail laying and which have been accepted as standard equipment by Class I roads.

If you are interested in a better, faster and easier way to drive spikes, write for further particulars on the new Nordberg Spike Hammer.

NORDBERG MACHINERY

**NORDBERG MFG. CO.** MILWAUKEE WISCONSIN

Export Representative—WONHAM Inc.—44 Whitehall St., New York

# MAINTAIN *Schedules AND* RIGHT-OF-WAY *with* LINK-BELT SPEEDER *Convertible* OFF-THE-TRACK *Equipment!*

For mobile lifting and carrying power in the car shops and stores departments, use the Cargocrane.

## THESE MACHINES DO MORE WORK · · WITHOUT SLOWING TRAFFIC!

Routine or special work on the right-of-way goes forward with no interference with traffic, when crawler-mounted, convertible, Link-Belt Speeder machines are used — and more *kinds* of work are accomplished, because they are so easily, quickly converted to different front-end attachments. Built for long lives of trouble-free service.

10,206

· · · *on the line — or in the yard* · · ·

GET A *Powerful Lift* WITH YOUR LINK-BELT SPEEDER!

**LINK-BELT SPEEDER**

*Builders of the Most Complete Line of*
**SHOVELS-CRANES-DRAGLINES**

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A DIVISION OF LINK-BELT COMPANY

# SEE FAIRBANKS-MORSE FIRST FOR MOTOR CARS

PROVED dependability, safety, and efficiency are important reasons why American railroads have used Fairbanks-Morse Motor Cars profitably for more than 50 years... important reasons why you, too, can use them to good advantage.

Most models are powered by a sturdy, two-cycle, reversible engine which has extra power for curves and grades. The lightweight is a feature especially desirable in this day of high-speed passenger and freight schedules.

There are Fairbanks-Morse Motor Cars for signal maintainers, track inspectors, superintendents, and section or bridge gangs, all made under one guarantee by one manufacturer.

Write today for full details on these economical, smooth-performing cars. Fairbanks, Morse & Co., Fairbanks-Morse Building, Chicago 5, Illinois.

**The powerful Fairbanks-Morse No. 53 car is light enough for one man to handle, yet carries a full section or bridge gang with tools. Hauls loaded trailers with ease.**

# Fairbanks-Morse

*A name worth remembering*

**Diesel Locomotives • Diesel Engines**
**Scales • Motors • Pumps • Generators**
**Magnetos • Stokers • Railroad Motor Cars and Standpipes • Farm Equipment**

# FOR TODAY'S RAILROAD JOB

*Specify*

## LOW COST-PER-YEAR CLAY PIPE

TODAY, engineers and builders are anticipating the needs of the future better than ever before. The life of drainage facilities need not be estimated as a matter of a few decades. Drainage installations *can last* . . . cost should be figured on a per-year basis over a long period of time.

**Clay Pipe Never Wears Out** because it is made of indestructible material, harnessed to man's use through vitrification. The men concerned with the construction and maintenance of big jobs, railroads, highways and airports are turning more and more to Clay Pipe for low cost-per-year drainage. Because it will not corrode, decompose or rust it does its job as well tomorrow as today.

**A Modern Drainage Tip:** Extra-Strength Clay Pipe eliminates or greatly reduces cradling and casement costs where extra-heavy loads are encountered.

**National Clay Pipe Manufacturers, Inc.**
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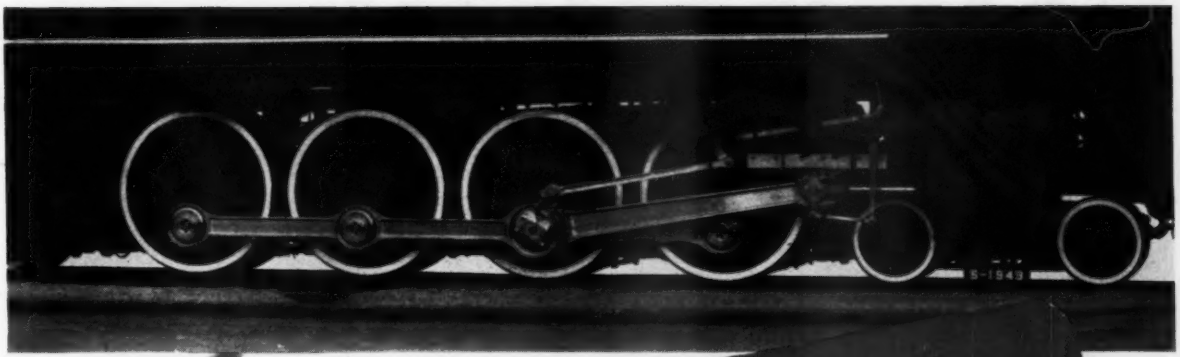
111 W. Washington St., Chicago 2, Ill.
571 Chamber of Commerce Building
Los Angeles 15, Calif.

C-546-3D

# CLAY PIPE



The same bearings that are free from speed restrictions on modern locomotives, cars and streamlined trains; that keep them on the job — out of the repair shop, give section motor cars and trailers better performance, greater endurance, lower maintenance.

There is no difference in the Timken Tapered Roller Bearings used in main line equipment and those used in section cars but size. All are manufactured of Timken Alloy Steel, by the same precision methods and under the same strict system of quality control.

Your section motor cars and trailers will be constantly available for service — always ready to go, if they are equipped with Timken Roller Bearings. To be sure of getting genuine Timken Bearings, look for the trademark "TIMKEN" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN
TAPERED ROLLER BEARINGS

# MOSS CROSSINGS

## *Will Do Your Job*

What characteristics make for the best grade crossing?

This problem has at some time or other had the attention of the engineering department of every railroad in the United States. And while there is a considerable difference of opinion on some of the details, most will agree on the major issues. Check the following Moss crossing features against your ideas of what a good grade crossing should be:

- **VERSATILE—Pre-framed for single or multiple, tangent or curved track. Adapted to crossings through railroad turnouts. Equally suitable whether crossing is at 90° or 30° angle with track.**
- **DURABLE—Many crossings in place 15 years with no apparent deterioration.**
- **SHIPPED READY TO INSTALL—No cutting and fitting on the job.**
- **NO SPECIAL TOOLS—A small track gang can do the job with regular tools.**
- **BUILT FOR HEAVY DUTY—Moss crossings are as rugged as the track.**
- **FULL SALVAGE VALUE—If crossing is eliminated, move sections to new location without waste.**

These crossings are now readily available and your inquiries will have our prompt attention.

CROSS TIES
SWITCH TIES
POLES & POSTS
PILING
CROSSINGS

**T. J. MOSS TIE COMPANY**

*The Stamp of Character* MC

FOUNDED 1879

700 SECURITY BUILDING ST. LOUIS, MISSOURI

WOOD PRESERVING PLANTS
MT. VERNON, ILL.
EAST ST. LOUIS, ILL.
GRANVILLE, WIS.
SHREVEPORT, LA.
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*Simple enough with a*
**WILLIAMS "SUPERRENCH"**

Those difficult and exacting jobs, impossible with ordinary wrenches, usually are simple enough with "Superrenches". Williams "Superrenches" have a ferret-like ability to slip into nooks and crannies and swing buried nuts or make delicate adjustments. Their positive, slip-proof grip reduces hazards to workman and fine equipment alike. Available in a wide range of sizes and patterns . . . sold by leading Industrial Distributors everywhere.

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WILLIAMS
DROP-FORGINGS AND DROP-FORGED TOOLS

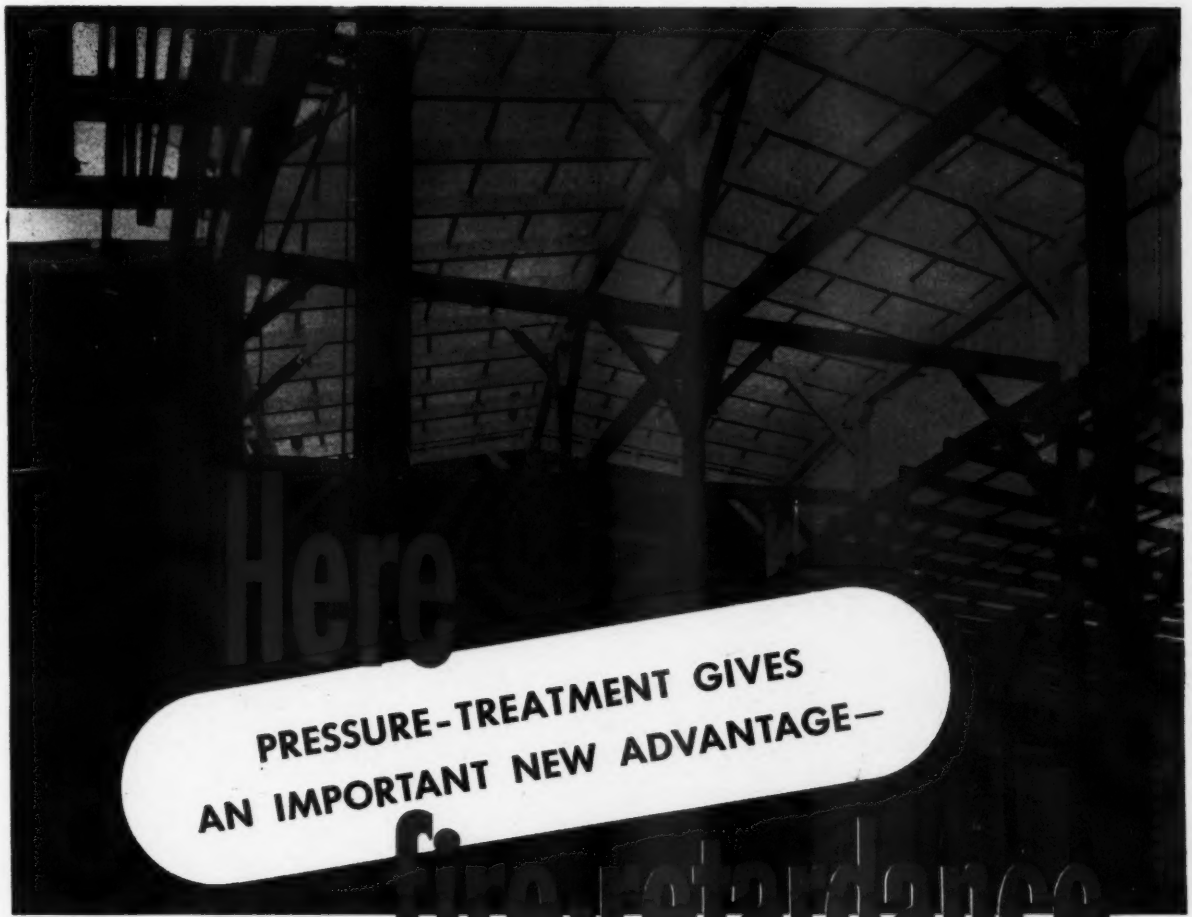
# Easier to Handle...

## in crowded gangs—along busy right-of-ways

UNDER any trackage repair conditions, a Barco Unit Tytamper is the most efficient tamping tool. For one man, alone, on a spot job, or a crew re-working a whole section, Barco is easier to handle, more economical, better able to get the work done. That's why Barco has grown steadily in favor everywhere on the leading railway lines. Send for complete information about low operating costs and opinions of users. Barco Manufacturing Co., Not Inc., 1805 Winnemac Ave., Chicago 40, Ill.

**BARCO** UNIT TYTAMPERS

FREE ENTERPRISE—THE CORNERSTONE OF AMERICAN PROSPERITY




In this engine house, Koppers Hi-retention CZC Pressure-treatment not only protects the wood structural members against decay, but gives a high degree of fire-retardance as well.

Under elevated temperatures, even untreated wood members retain their strength longer than structural metal members of equal original capacity. This natural property is reinforced and multiplied by treatment. Underwriters Laboratory tests of wood treated by this process show a 60% reduction of flame spread and a 65% reduction of fuel contributed, on a scale with untreated oak at one end and asbestos cement board at the other.

By making wood fire-retardant, Koppers Hi-retention CZC Pressure-treatment further increases the long list of advantages that recommend treated wood for permanent structures: low first cost and minimum maintenance; ease and speed of erection; resistance to corrosion from fumes and dampness; and all-around durability. Already coming into general use among railroads for structural members and roof decks in engine houses, the use of fire-retardant wood can be profitably extended to shops, freight and passenger stations, and similar structures.

We will pre-frame wood, treat and ship ready for assembly, or treat and return members pre-framed in your shops. Wood Preserving Division, Koppers Company, Inc., Pittsburgh 19, Pennsylvania.

There are several factors that combine to make the Air Tamper a better machine. For instance, it is the lightest tamper made—its operation is so simple that a minimum of instruction is required—it is streamlined and easy to handle—maintenance costs are the lowest of any known type of mechanical tamper.

The uniform blows of the percussive action of the air tamper produce tight tamping under the ties and an even job. Adjustment of the air pressure regulates the blow to best suit the type of ballast being tamped. The result is a smooth track that stands up longer under heavy and high-speed traffic. *For better track use MT-3 Air Tampers.*

AIR TOOLS
COMPRESSORS
CONDENSERS
ROCK DRILLS
TURBO BLOWERS
CENTRIFUGAL PUMPS
OIL & GAS ENGINES

**Ingersoll-Rand**

11 Broadway, New York 4, N. Y. 11-836

**ORIGINATOR OF MECHANICAL TAMPING**

# Saves its Cost IN MAN-HOURS!

OPERATED, TRAVELED AND STEERED FROM THE CRANEMAN'S SEAT

## Air-Controlled

- AUTO-TRUCK MOBILITY
- ANTI-FRICTION BEARINGS
- AIR-OPERATED CLUTCHES
- SAFETY HOIST BRAKES
- BALANCED WEIGHT RATIO
- SIMPLE, POWERFUL DESIGN
- RANGE OF SEVEN MODELS

*SEND FOR CATALOG No. 73*

Without fatigue, and all day long, *one man,* with an Aero-Crane, does the work of 4 or 5 men—gets your material onto the stockpile and off again at minimum cost. One man handles those 200 to 1000 lb. loads that otherwise eat up the time of a crew!

Designed for rapid yard work, the Aero-Crane goes anywhere a truck can go. You can travel it light or loaded with boom in any position. Your craneman needs no helper to steer or operate. Tough-built, with anti-friction bearings throughout, electric welded construction, non-burn clutches, air-controls, Aero-Crane keeps going free of breakdowns—pays for itself in saved man-hours alone!

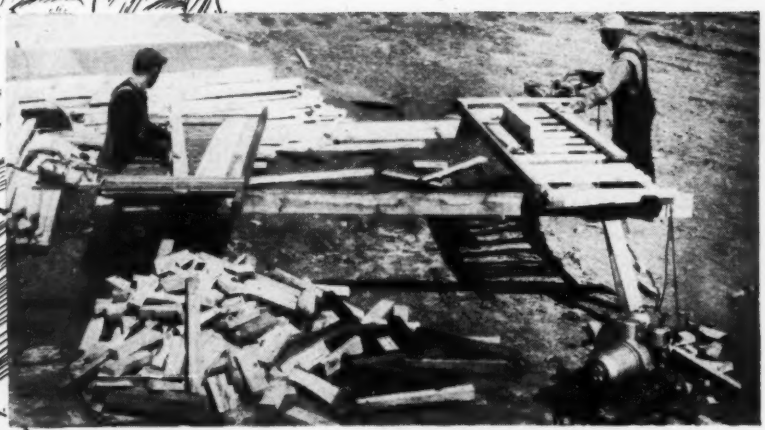
Built in a range of seven models. Capacities of 3,500 to 50,000 lbs. at 12 foot radius. Diesel or gasoline powered.

**ORTON CRANE & SHOVEL CO.**
608 S. DEARBORN ST., CHICAGO 5, ILL.

SENSITIZED

POWER

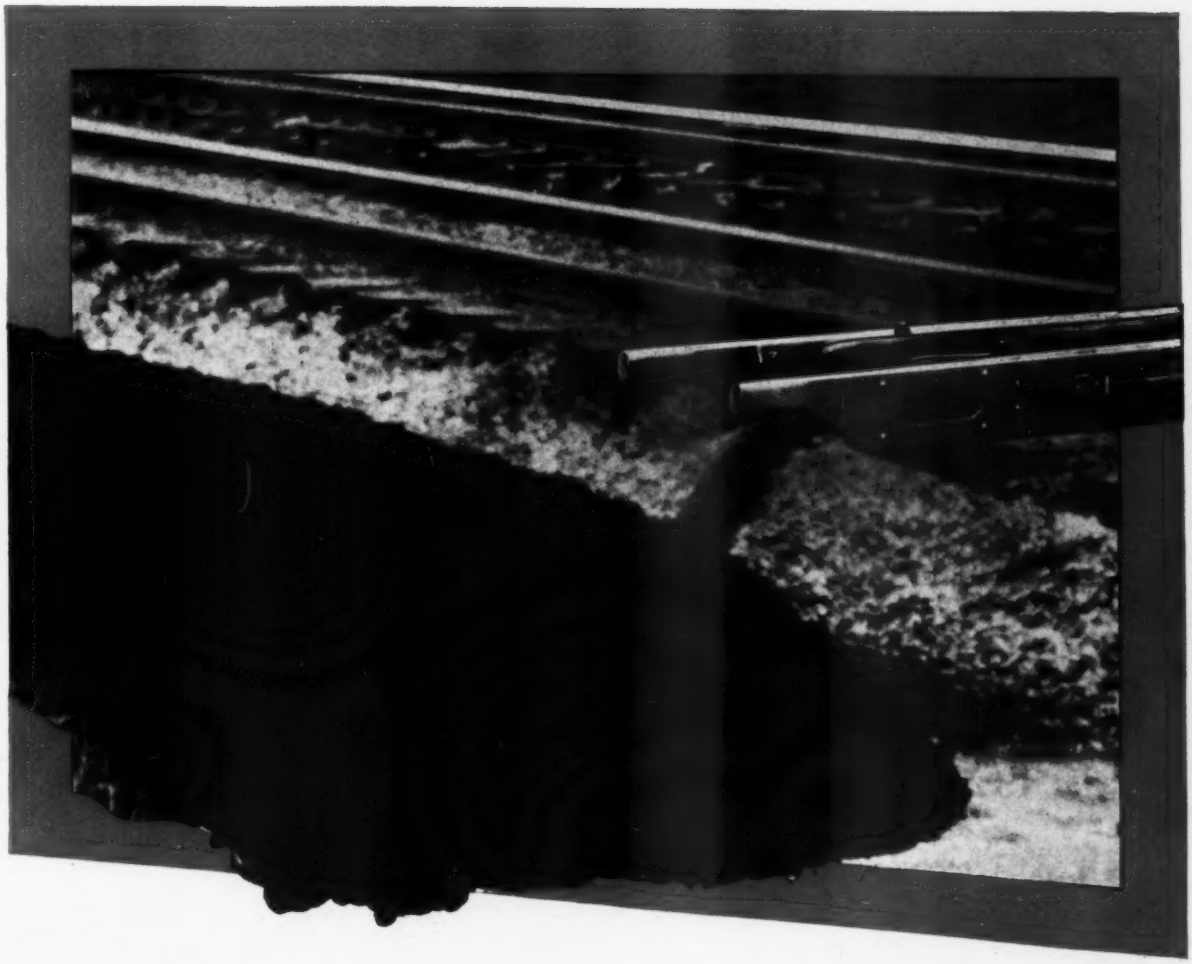
# See them in action doing your work on your job



See how men work faster with electric tools operated by Homelite Portable generators. Test the capacity, speedy priming and operational advantages of Homelite Pumps on your toughest dewatering job.

There's only one real way to see how well a Homelite Pump handles large volumes, seepage, mud . . . or how easily a Homelite Generator supplies steady current for floodlights, cost-cutting electric tools, communication systems, etc. That way is to get 'em out on the job. Yes, get these handy portable gasoline-engine-driven units out on *your* job and see how they measure up to *your* standards. See how they work for *you*. All you have to do to get a free demonstration . . . the only way to see in advance what you should get for your money . . . is to write to us today. We'll arrange to have a Homelite Representative see you soon.

**Homelite**
CORPORATION
Port Chester, New York
**Portable Pumps Generators and Blowers**
GASOLINE-ENGINE-DRIVEN



# MOUNTAINS (OF DIRT) FROM A "MOLE"

The mountain range above is only two feet high but it represents the peak of roadbed maintenance efficiency. Just a flick of the switch starts the new model McWilliams "Mole" Ballast Cleaner through the ballast of your road, sifting out unwanted cinders and dirt as it moves forward 3 feet per minute.

**RAILWAY MAINTENANCE CORP.**

PITTSBURGH 30, PENNSYLVANIA

**"CZC"- TREATED WOOD** has many features which especially recommend it for loading platforms. It prevents decay and resists termites. It is resistant to fire and abrasion.

Maintenance costs are lowered wherever "CZC"-treated wood is used. Du Pont Chromated Zinc Chloride makes wood durable—last longer. Treated wood is clean and easy to handle, has no objectionable odor to contaminate foodstuffs when stored on platforms awaiting shipment.

The proven effectiveness of "CZC"-treated wood recommends it for *all* railroad structures. Find out about this wood preservative that cuts maintenance costs to a minimum. E. I. du Pont de Nemours & Co. (Inc.), Grasselli Chemicals Department, Wilmington 98, Delaware.

# STREAMLINED TRAFFIC Means STREAMLINING MAINTENANCE

ALL ALONG THE LINE . . . in every phase of railroad operation . . . new, streamlined methods and equipment are being adopted by forward looking railroads.

The new Athey W4-5 MobiLoader, mounted on "Caterpillar" D4 Tractors, is being hailed by many railroad officials as the answer to scores of maintenance problems. This versatile, economical unit is ideal for railroad right-of-way maintenance and material handling jobs as well as general utility uses.

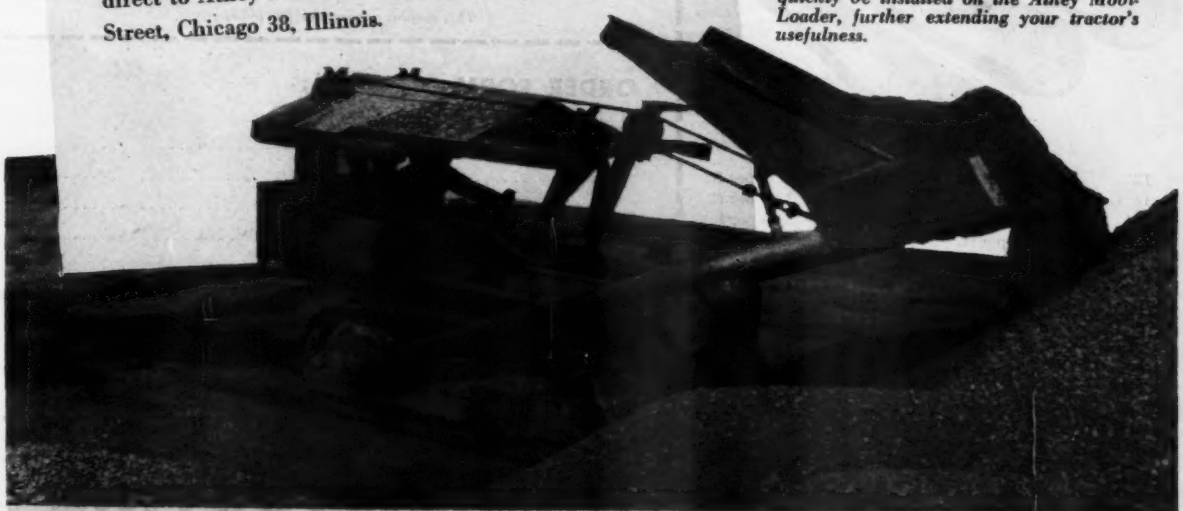
The W4-5 Athey MobiLoader is hydraulically-controlled. It picks up its load at the front, travels in reverse, and discharges to the rear . . . then returns immediately for another load, requiring minimum time and space.

Investigate the advantages of equipping your tractors with economical Athey MobiLoaders. See your Athey-"Caterpillar" distributor for complete details, or write direct to Athey Products Corporation, 5631 West 65th Street, Chicago 38, Illinois.

## With the NEW ATHEY W4-5 MOBILOADER

Athey APCOR Products

*An interchangeable bulldozer blade can quickly be installed on the Athey MobiLoader, further extending your tractor's usefulness.*



**Athey**

DEPENDABLE LOADING & HAULING EQUIPMENT

GOVERNMENT-OWNED SURPLUS

# GALVANIZED CULVERT PIPE...

# now AVAILABLE

**CORRUGATED . . IN HALF SECTIONS . . NESTED . . FLANGED TYPE FOR BOLTING**

Here is real opportunity to get a quantity of high quality culvert pipe without delay—for surface water disposal. Each section of pipe is fabricated in half sections, flanged and nested for ease of handling and shipping. When in use, the top half is fitted to the bottom half and bolted tight. All sizes from 12 inches to 72 inches in diameter. Over a million and a half dollars worth of this surplus piping is available and stored at War Assets Administration Regional Offices throughout the country. Check the price and size listing at left, then phone your order to your nearest War Assets Administration Regional Office listed below . . . or if you wish, clip the coupon—indicate sizes and quantity wanted—and *mail right now.*

*This surplus property subject to prior sale.*

| | | | |
|---|---|---|---|
| 12" | .42 per ft. | 36" | 1.53 per ft. |
| 18" | .45 per ft. | 48" | 2.04 per ft. |
| 24" | .75 per ft. | 60" | 2.93 per ft. |
| 30" | .93 per ft. | 72" | 3.59 per ft. |

**VETERANS OF WORLD WAR II:** This surplus property is offered to priority claimants including Veterans of World War II. To help you in purchasing surplus property, a Veterans' Unit has been established in each of our Regional Offices.

**ORDER FORM**

To War Assets Administration:

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Name.....Tel. No.....

Firm.....

Address.....

City.....State.....

**MAIL TODAY**

516

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**Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cleveland • Dallas • Denver Detroit • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane Cincinnati • Fort Worth (Telephone 3-5381)**

THE IMPROVED FAIR RAIL ANCHOR
IT GRIPS - IT HOLDS
THE P. & M. CO.
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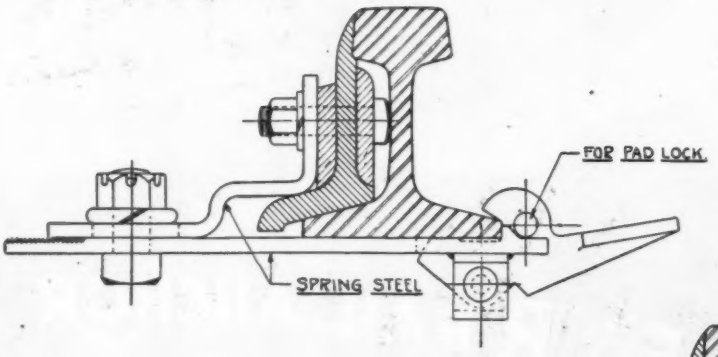
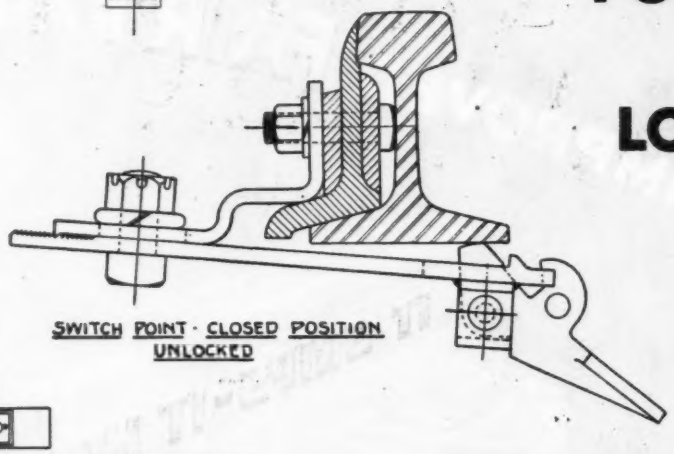
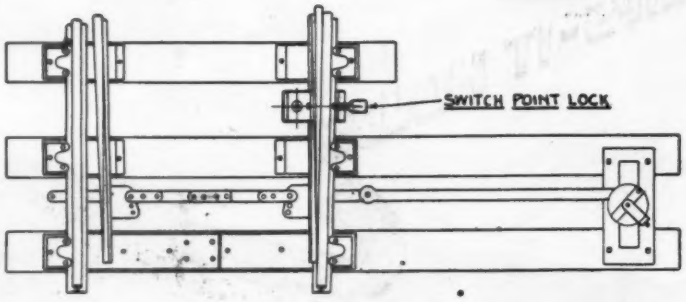
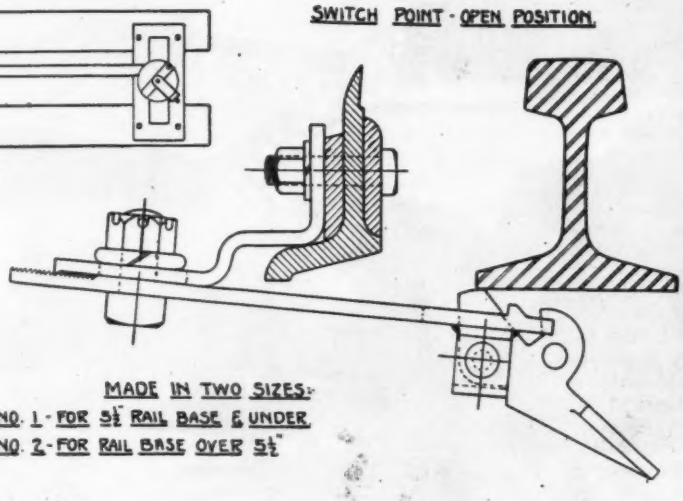
# AUTOMATIC SWITCH POINT LOCK

SAFETY WITH ECONOMY




The switch point lock is a safety device, of rugged construction, simple in design, and a self-contained unit. It is automatic in its closing and locking action.

To operate the switch point lock, put foot on lever and push down, then operate switch stand lever in usual manner to throw or open switch. To close switch, operate switch stand lever in the usual manner and the device automatically returns to its normal or locked position.

MADE IN TWO SIZES:
NO. 1 - FOR 5½" RAIL BASE & UNDER
NO. 2 - FOR RAIL BASE OVER 5½"

## THE RAILS COMPANY

General Office
178 GOFFE STREET
NEW HAVEN 11, CONN.

ST. LOUIS, MO. HOBOKEN, N. J. CHICAGO, ILL.

*Building up worn open hearth frog in traffic.*

# WHAT'S THE BEST WAY . . .

# TO BUILD UP WORN FROGS?

Airco railroad technical men have been working for years on many railroads, helping to work out best practices for building up worn frogs—in track and out of traffic.

On the basis of this experience, they recommend:

*FOR MANGANESE FROGS—flame gouging of any defective sections and building up these sections and the worn areas by arc welding, using manganese electrodes. In arc welding, applied with the correct technique, the base metal is heated over a less extensive area and to a lesser depth, thus preserving the hard and tough characteristics of the original frog.*

*FOR OPEN HEARTH FROGS—building up worn areas by gas welding, using the fast flowing Airco Railroad Rod, especially developed to produce a hard, resisting surface required for long track life.*

Because Airco makes and sells equipment and supplies for both oxyacetylene and arc welding, Airco technical men are able to recommend the process which will give best results.

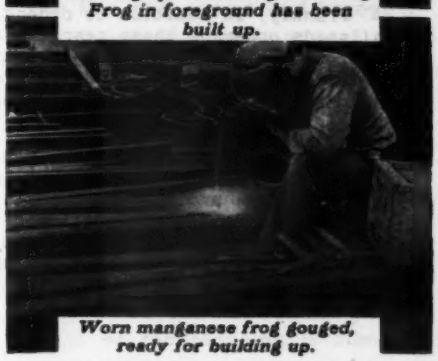
For unbiased assistance of this type, put all your maintenance-of-way welding problems up to Airco railroad technical men. Mail the coupon for your copy of the 32-page illustrated book, "Efficient Maintenance-of-Way Operations with the Oxyacetylene Flame and Arc Welding." You'll find it both interesting and helpful. Write: Air Reduction, 60 East 42nd St., New York 17, N. Y. In Texas: Magnolia Airco Gas Products Company, Houston 1, Texas.

*Costs Come Down Under the Airco Plan*

**AIRCO AIR REDUCTION**

*Offices in all Principal Cities*

*Building up worn manganese frog. Frog in foreground has been built up.*



*Worn manganese frog gouged, ready for building up.*

**Air Reduction** REM
60 East 42nd Street
New York 17, N.Y.

*Send a copy of "Efficient Maintenance-of-Way Operations with the Oxyacetylene Flame and Arc Welding" to*

Mr. _____

Title _____

Road _____

Address _____

City _____ Zone ____ State _____

No. 210 of a Series


# Railway Engineering and Maintenance

SIMMONS-BOARDMAN PUBLISHING CORPORATION

105 WEST ADAMS ST.
CHICAGO, ILL.


**Subject:** Reprints of Water Service Series

June 1, 1946

Dear Readers:

Many of you have been reading with interest and benefit, I am sure, the series of articles on Maintaining Water Service Facilities, by Clarence Knowles, that has been appearing in alternate issues of Railway Engineering and Maintenance since April, 1944—another installment of which series, dealing with water columns, appears in this issue. Remaining installments of this series will discuss water facilities for Diesel locomotives, the maintenance of water treating facilities, and the prevention of water waste.

In planning this group of articles initially, we sensed a real need for such a series, both because of the magnitude and importance of water service in the railway field, and because nowhere else is such material to be found as a whole, written in the language of the man in the field. And we have reason to believe that this series has been of help in filling this need, both through your comments from time to time and the considerable number of requests that have been made for extra copies of the issues containing the various installments.

Maybe this need as visualized initially is being filled adequately by the wide circulation that is being given the series currently in Maintenance, but because of inquiries that have been made, I want to raise the question of the value to you of reprints of the series, when completed, in a convenient, pocket-size booklet, possibly with a detailed index for ready reference purposes. Are there a sufficient number of you who will want such reprints, reasonably priced, to warrant their publication? This question is asked in the interest of rendering an added service to you. What are your desires?

Frankly, in addition to orders by individuals, I can visualize a number of railroads ordering these reprints in quantities for distribution among their water service supervisors and repairmen generally, as well as their division and system officers with jurisdiction over water service matters, so that these men will have readily at hand for reference the valuable material in this series. But, again, that is up to you.

To give us an idea of your desires and probable needs, will you take the time to tell us of your interest in reprints of this series? A brief note will be sufficient, and will not commit you in any way. Obviously, if your needs are being filled by the publication of the series in Maintenance, there will be no point in running off reprints. On the other hand, if a real demand exists, we would feel that we were overlooking an opportunity to be of added service to you if we did not ascertain the extent of this demand and plan to meet it.

Sincerely,

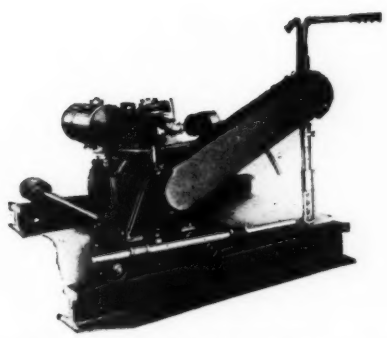
Neal D. Howard
Editor

NDH:jb


MEMBERS: AUDIT BUREAU OF CIRCULATIONS AND ASSOCIATED BUSINESS PAPERS, INC.

# 75% of track regaging eliminated

# *Raco Tie Borer*



The Raco Tie Borer weighs only 245 lbs. and can be pushed or pulled along level track with a 5 lb. pressure.

**Other Raco Machines:**

***The Model A Raco Power Track Wrench***

***The New Model B Raco Power Track Wrench***

***The Raco Tie Borer***

***The Everett Power M-W Drill***

**The Raco Tie Borer as employed in rail laying, accomplishes two obvious things:—Halves the number of spike setters required, and eliminates the necessity of re-aligning tie plates, after spikes are driven, which requires from 5 to 7 men.**

**But the big dividend comes from the fact that the rail 'holds its line'—which it never did before. In 5 to 6 weeks after rail is laid, it is necessary to go over it, fair the line and curves and regage the track. Previously it was exceptional to find three lengths of rail that did not have to be touched, and regaging necessarily was a continuous operation over newly laid rail. With the Tie Borer in operation 75% of the track does not have to be touched and that, of course, means that 75% of the regaging is eliminated.**

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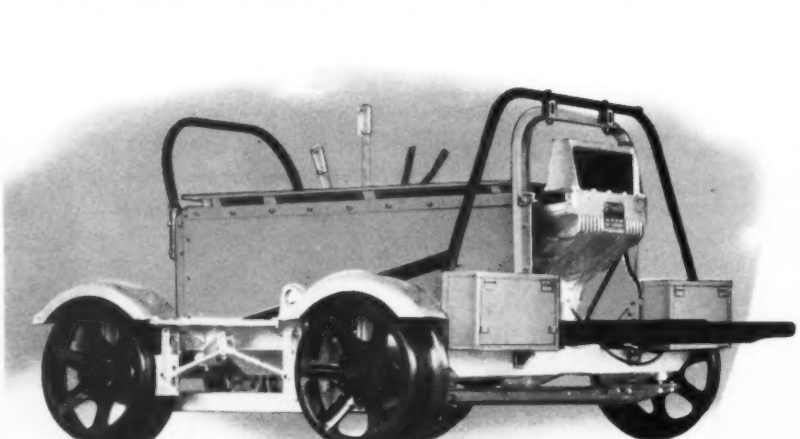
**Fairmont** All of which adds up to performance on the job.

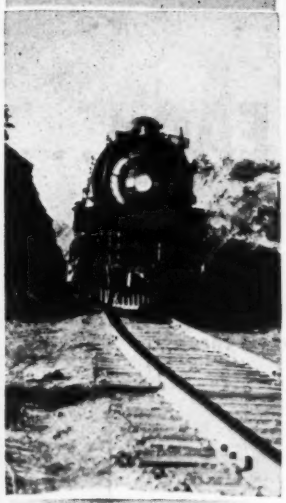
Fairmont Railway Motors, Inc., Fairmont, Minnesota



Simplicity is exemplified in the Fairmont M9 Series F Spring Mounted One-Man Inspection Car by its all-aluminum frame, its endless cord belt drive and its single cylinder engine which has few moving parts. Strength and durability are combined with lightness. The general simplicity of construction gives the M9 Series F a long service life with a minimum of maintenance. Get Bulletin 527 for complete specifications.

*Performance* ON THE JOB COUNTS

**OF ALL THE CARS IN SERVICE TODAY . . . MORE THAN HALF ARE FAIRMONTS**



# Railway Engineering and Maintenance

NAME REGISTERED U. S. PATENT OFFICE

JUNE, 1946

**Editorials** - - -

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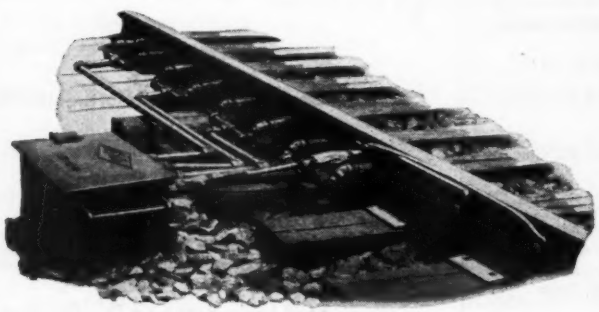

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Railway Engineering and Maintenance

# *Unfair Competition—*

## Do Employees Realize the Seriousness of It?

One of the most serious threats to the successful future of the railways—to every railway officer and employee—is the competition to which they will be subjected in the years immediately ahead—not the competition of rival forms of transportation operating on a fair and equitable competitive basis, with each paying its own way and winning traffic on the basis of its service to the public, but rather the competition of other forms of transportation that will make serious inroads on the railways only with the aid of subsidies and other favors in one form or another from federal, state and municipal governments, at public expense. If the railways are to continue dominant among the country's transportation systems, adequate to the needs of peace and war—indeed, if they are to operate successfully at all—the threat of unfair competition must not only be recognized by railway employees and the public in general, but must become a "burning" issue with them.

Are the public and railway employees aware of the threat to the country's welfare, and to their own welfare, by the inequitable treatment that is being accorded the various forms of national transportation? Are they aware, for example, that while the railroads are surrounded and restricted on all sides by the edicts of regulatory commissions, administrative officials, legislatures and city councils, rival forms of transportation on the highways and waterways, and in the air, are rapidly expanding their plants or scope of operation under far less stringent legislation, and to a large extent at public expense?

The Opinion Research Corporation of Princeton, N. J., pioneer organization in the scientific measurement of public opinion by skilled samplings, based on personal questioning by trained interviewers, has conducted annual surveys of public opinion for the Association of American Railroads for the last five years. In the 1945 survey, it was disclosed that 74 per cent of the public favored fair and equal treatment of all forms of transportation, but, at the same time, 62 per cent of those who had an opinion (16 per cent had none) believed that such equality of treatment had already been attained.

The fact that the railroads have to build, maintain and pay taxes on their roadways, while improved waterways are built and maintained by the taxpayers without any contribution by vessel operators, has made no significant impression whatever on a majority of the public, which seems equally unaware of the inequality of treatment inherent in the fact that commercial highway and air transport facilities are paid for in large measure from general taxation.

Speaking of the inequitable situation that prevail between the various forms of transportation in an address prepared for presentation before the annual convention of the Railway Tie Association, which was to have been held in Cincinnati, May 28-29, W. G. Vollmer, president of the Texas & Pacific, says in part:

"Of the four principal systems of transportation, the railroad is the only one that owns and maintains its fixed plant facilities and pays taxes upon all of them. Other transportation systems have been spared the expense of building and maintaining their fixed plants. The taxpayers have provided them with magnificent highways, elaborate and expensive air terminals and services, and costly inland waterways. All that the

other commercial forms of transport need to carry out their operations are the vehicles and equipment and something to keep them in repair.

"To illustrate, if a highway bridge is swept away by flood water, the commercial trucks and buses simply use another highway while some government agency makes the necessary repairs. But if the same flood water destroys a railroad bridge, the railroad must purchase the materials necessary for repairs and make these repairs at its own expense; and at the same time suffer financial loss due to interrupted traffic.

"More than 300 terminal-type airports have been constructed in the United States by various city, state and federal governments. These airports are almost wholly operated and maintained at public expense. In Texas, there is a large and extensively used air field which cost the taxpayers nearly $3,500,000. If the ordinary principles of business are applied to the operation of this air field, interest on and amortization of the capital expenditures, and out-of-pocket costs of maintenance and operation, run the annual expense to approximately $250,000.

"Three commercial air lines use this field, and, for this privilege they pay slightly more than $14,000 annually, in addition to which the municipal government, which owns and operates it for the taxpayers, receives approximately the same amount of revenue for the pay toilets, pay telephones, and various concession rentals, such as restaurant and newsstand. Based on the number of flights daily—landing and take-off considered as one operation—the city's unit cost per flight amounts to about $8.23. Of this unit cost three air lines pay 53 cents; the taxpayers pay the remainder—$7.70."

According to the recent survey of the Opinion Research Corporation conducted among railway employees by this publication, in co-operation with Railway Age and Railway Mechanical Engineer, and commented on in the last two previous issues, 64 percent of all railway employees (64 per cent m. of w. and s. employees) believes that, prior to the war, railroads, air lines and waterway and highway carriers all had an equal chance to make a fair profit.

This substantial majority of employees reached this conclusion despite the fact that even a slightly larger ratio (68 per cent of all employees—65 per cent m. of w. and s.) appears to be aware that railway taxes—all going for general governmental expenses, and none for providing railroad facilities—are more burdensome than the taxes paid by other forms of transportation, such taxes (or, more properly fees) being used largely for the taxpayers' own benefit.

The inference is that, while about two out of three railroad employees realize the inequality of the railroads' position with respect to taxes, they do not believe that this inequality has any important bearing on the railroad's ability to operate at a profit, and thus compete successfully with other forms of transportation. This being the case, is it any wonder that the general public is no better informed on these matters than it is, and that the situation, rather than improving, is growing less favorable?

Mr. Vollmer speaks for all of the railways of the country, and in the interest of all of their employees, when he says:

"A sound, solvent and efficient national railway system is essential to continued economic progress. The progress of American commerce and industry is measured in terms of transportation—rail transportation. The railroads are so vital to the safety of our country in time of war, and to the welfare of the nation in time of peace, that they must continue to operate successfully. Subsidies that give one system of transportation competitive advantages over another are not in keeping with the American system of free enterprise—the system under which America was founded and has grown to greatness.

"All the railroads ask is that the principle of free, competitive enterprise apply to all; that the service each renders the nation be the measure by which its existence is justified. Real progress comes not through the oppression of one industry to promote another, but through equal opportunity for all. The railroads seek only that."

What Mr. Vollmer and the railroads are calling for can come only through the co-operation of all railroad employees. They must stand behind railway managements as "a man," and fight for equal opportunities for their industry. The tragedy is that at a time when such co-operation is so imperative—when the railroads and their employees should be pulling together as never before to improve their services and ward off the inroads of other forms of transportation—strikes and threats of strikes in disregard of the "long-pull" consequences to the industry and, thus, all of its employees, have been holding them apart. This unfavorable situation must be overcome, and complete harmony and unity of purpose must be restored. Without it, both the railroads and their employees will suffer. With it, and an aggressive battle jointly for equitable regulation, taxation and opportunity, no one on the railways need have serious concern about the future of the industry, or his own personal welfare. This presents a real challenge to railway managements and railway employees alike. Will they meet it?

# Machines—

## Help to Keep Men on the Job

THE trend toward the mechanization of railway maintenance work that started upwards of 25 years ago, and is still in progress, derives its motivating force primarily from the desire to effect economies in such work by promoting increased efficiency. Secondarily, it is recognized that the work done with the aid of machines is frequently of a better quality than that performed by hand and that fewer personal injuries are incurred. Growing out of present-day conditions is still another factor tending to strengthen the need for more intensive mechanization; this is the knowledge than when machines are used to perform work that is difficult and arduous when done by hand, less difficulty is experienced in keeping men on the job.

While the acute man-power shortages of the war years have been greatly alleviated in most parts of the country, some railroads are still experiencing difficulty in obtaining men for maintenance work, especially on the track,

and holding them for any length of time. As long as jobs are available elsewhere that pay as much or more than railroad maintenance work, it is not difficult to understand the reason for this situation. Much of the manual work that is performed in connection with track maintenance is heavy and tiring, and it is not surprising that this means of making a livelihood is shunned by workmen if other, less arduous, jobs are available paying comparable wages.

The mechanization of maintenance work has made great strides, but some of the more difficult operations must still be performed by hand. Furthermore, there are some operations which, while done mechanically when performed out-of-face by large gangs, are still carried on by hand when the work is done on a small scale. Thus, the section gang, which is still the backbone of the track-maintenance forces on most railroads, must still work to a large extent without the aid of machines, although it is true that a limited number of roads have made progress in putting power machines in the hands of their section gangs. A manifestation of this trend is the increasingly common practice of providing section gangs with power spot-tamping outfits. Tamping ties with hand picks is one of the most arduous, and therefore unpleasant, jobs which section men are called on to perform, and when machine tampers are made available to the men for doing this work an important step has been taken to make it more attractive.

Economic conditions being what they are, with wage scales showing a persistent uptrend, maintenance officers are being pressed to introduce machines for doing work that has not heretofore been mechanized, and to intensify the use of existing types of machines, primarily in the interest of economy. At a time when jobs are relatively easy to get in industry generally, an important collateral advantage of greater mechanization will be to make it easier to obtain workers for maintenance jobs and to keep them from straying away.

# Treated Lumber—

## Should Have Wider Use in Buildings

FROM the beginning of wood preservation in this country, when, in 1838, the Northern Central (now part of the Pennsylvania) Kyanized enough ties to equip one mile of track, to the present, the railways have not only been the largest, but the most consistent, users of treated wood. Even today, 108 years later, and despite the number of other industries that are using treated wood, the railways are using approximately two-thirds to three-fourths of all of the wood treated in this country.

In view of this long familiarity with the use of treated material by ranking maintenance officers, and with knowledge of the benefits to be derived from such use, it is somewhat difficult to understand why railway building officers have resisted so consistently and so successfully every effort to utilize treated wood in buildings. While there may not be quite the same degree of economic justification for its use in buildings as for some other purposes, that is, while such use may not bring so large a return relatively as does the treatment of ties, bridges, piles, poles, etc., sufficient benefits are to be derived from its use in many buildings, or in parts of buildings, to justify its use from the standpoint of economy.

One of the arguments advanced in the past against the use of treated wood in buildings is that no form of treatment is completely dependable except creosote, and that this cannot be used for exposed members or for those that are in contact, directly or indirectly, with finishing materials. Obviously, if this is true, it eliminates at once most of the possible uses of treated wood in buildings.

But this statement was never entirely true, and it carries less weight today than even before, because numerous salt preservatives are now available that give excellent protection against decay, and some of them also resist termite infestation. These salt, or "clean" treatments as they are sometimes called, produce material that can be used in the same places and for the same purposes in buildings as untreated wood. Again, some of them make the wood fire resistant, as well as decay resistant, giving an additional reason for their use.

Under ordinary service conditions a treated member in a building will last from three to four times as long as the same member will when untreated, except, perhaps, certain interior members that always remain dry, because dry, protected wood does not decay. However, those members that are exposed to the elements, that are in contact with the ground or that remain damp much of the time, such as those below the first-floor level, may be expected to develop infection, sooner or later, from decay-producing organisms, unless this infection is inhibited by suitable preservative treatment.

All members subject to constant or recurring dampness, such as sills, sub-floors directly above basements or foundations, and wood that is in contact with the ground, should be treated with coal-tar creosote. One of the specifications of the American Wood-Preservers' Association lists 30 members that should be treated if they are in or below the first floor of buildings. Others can be given clean treatments with any of the approved preservative salts, after which they can be painted with the same facility and the same results as untreated surfaces.

There has always been some economic justification for the preservative treatment of building lumber, even in the days when it was plentiful, and when both the lumber and the labor of applying it were cheap. Today, because of the scarcity of lumber, because a much larger percentage of that which is available is sapwood, which decays easily and quickly, and because of the high cost for both original application and replacement, there can be no debate as to the justification for preservative treatment of a large percentage of building lumber. It would seem, therefore, to be the part of wisdom for building engineers to give this subject intensive study.

### Manufacturers Doing Their Part

**Adding to the evidence that the manufacturers are making good on their promises to bring out in the post-war period many new and improved materials, devices and equipment applicable to railway maintenance work, the Products of Manufacturers section of this issue, beginning on page 647, contains descriptions of 10 such developments of recent introduction.**

# Laying C

**Inside the Tunnel After the Continuous Rails Had Been Laid**

AS THE final phase of its program of track rehabilitation through Franklin tunnel, in the Coast range of California, near Richmond, Cal., the Atchison, Topeka & Santa Fe has recently completed the installation of 112-lb. continuous pressure butt-welded rail to replace the 90-lb. section, in standard 39-ft. lengths, previously in service. The first phase of the program of track rehabilitation—complete renewal of the ballast and replacement of ties—was described in an article appearing on page 770 of the August, 1945, issue of *Railway Engineering and Maintenance*.

Franklin tunnel is 5,600 ft. long from portal to portal and, since considerable trouble had been experienced with both joint assemblies and rail ends of the lighter rail that was being replaced, it was decided to avoid a similar experience with the new rail by installing long continuously-welded rails. This was done with only one break in the rails between portals, at insulated joints about 3,000 ft. in from the west portal.

The location of the insulated joints in the tunnel made it necessary to weld the rail in four strings instead of two. The north and south rails at the west end each contain 79 standard 39-ft. 112-lb. rails, while each of those east of the insulated joints contain 65 similar rails. However, since the upset of the rail ends during the welding operation absorbed ¾ in. of length at each joint, the actual lengths of these long welded rails under the average temperature prevailing at the time were 3,076 ft. and 2,531 ft., respectively, representing a total length of 5,607 ft. of track with welded rail.

As a preliminary to the main operation of preparing the long rails, a welding site was chosen at Christie, Cal., about two miles from the west portal, where a siding provided a place for unloading the rail as it was received, for storing it until the welding was started, and for the actual welding operations, without interfering with main-line train movements. Here also, the welded rail was stored pending its movement into the tunnel.

### Transported on Push Cars

Because the siding available contained several curves, an unusual feature was introduced into this project, which involved the use of push cars to carry the rail as it came off the welding line. Usually, in work of this character, the rail has been supported by and moved forward on a series of rollers as it left the welding line. In this case, however, the rail was suspended beneath a series of push cars by means of U-bolt hangers that depended from two ties that were supported longitudinally on and overhung the deck of each of the push cars.

As each new rail was welded on, the string was moved forward a rail length and a new push car was set on the track a short distance from the advance end of the welding line. Two intermediate supports, consisting of timber blocks, each with a roller on top, were used to support the rail as it came directly from the end of the welding line, before it was engaged by the hangers on the push cars.

In part, this method of supporting the long rails was chosen because the push cars guided the rail automatically around curves of the siding as the welding progressed and the string moved forward. If the rail had been supported on rollers in the usual fashion, it would have been necessary for one or more men to guide it around the curves as it moved forward, to see that it remained on the rollers. When one of the long rails was welded to the required length it was lowered to the ties of the siding, where it remained until it was to be moved into the tunnel, and the subsequent lengths were run out directly above it.

The use of push cars to advance the welded rail from the welding and finishing operations was somewhat of an innovation, and was decided upon initially when original plans called for moving each long length of rail directly to the tunnel as completed. This procedure could not be followed since at least some of the welding work was completed before the ballast and tie renewal work was finished in the tunnel, but the push-car arrangement was used anyway, and proved highly effective, especially in view of the curved alinement of the siding employed for the welding work. In unloading the rails from the push cars to the center of the siding, track jacks were used to raise them sufficiently to permit them to be disengaged from the hangers, and to lower them to the ties.

As the rail was received it was unloaded with a Burro crane and was placed on a rail rack. The equipment used consisted of a Racine power hack saw; an Oxweld pressure butt-welding machine; a reheater for normalizing the area affected by the heat of welding; oxygen and acetylene manifolds; a small winch powered by a gasoline engine, for moving the strings of rail as the welding progressed; and a train of rollers for carrying the rail through the trimming, welding and normalizing processes.

Welding operations were started at Christie on February 15, 1945, and were completed on March 29. However, this period included the welding of two strings of rail, each containing thirty-two 39-ft. rails, for Muir tunnel, another tunnel relaid with welded

# Continuous Rails in Santa Fe Tunnel

**Owing to foul ballast and bad drainage conditions in Franklin tunnel, near Richmond, Cal., the track required complete rehabilitation. The first phase, carried out after the drainage conditions were corrected, involved the renewal of the ballast and a liberal renewal of the ties, and was described in a previous article. The last phase of this work, consisting of the replacement of the existing 90-lb. rail with welded 112-lb. rail, is described in this article.**

A Length of Welded Rails, Supported by Push Cars, Coming from the Welding Line

General View of the Welding Set-Up. The Welding Machine Is Under Canopy

rail, located only a short distance from Franklin tunnel. Because the renewal of the ballast and ties in Franklin tunnel was not completed until late in the summer, the laying of the rail in this tunnel was not started until August 28, but was finished on August 30.

Preparatory to moving the rail into Franklin tunnel, which was done one rail at a time, the rail was raised with jacks to the point where the hangers were again engaged and the rail was slung from beneath the push cars. At this time the cars were spaced 48 ft. apart, since this spacing allowed the rails to clear turnout rails over which it was necessary to pass while enroute to the point of installation.

When a long rail was ready to be moved, a Diesel-electric switch engine, used in the work described in the previous article, was coupled to the forward end of the rail by means of a specially-designed coupler. Normally, this coupler was sufficiently rigid to control the rail in accordance with the braking action of the locomotive. To assure the desired control of the rail in an emergency, however, men were placed at intervals on the train of push cars to operate the hand brakes of the cars if the need should arise. Each rail was thus transported into the tunnel at the speed of a moderate walk.

When the rail had been brought to correct position in the tunnel, it was lowered in the same manner as it had been lowered before at the siding, and the push cars were tipped against the sides of the tunnel. In this case, however, the rail was let down onto wooden blocks which supported it at an elevation slightly higher than the top of the 90-lb. rail in the track. As the push cars were removed from the track, the welded rail was barred outside the running rail and was spiked to the ends of the ties at intervals of about 12 ft.

It required 1 hr. 12 min. to take the first rail into the tunnel, and 1 hr. 20 min. for the second. Both were for the south side of the track, the second and longer of the two being for the west end. The third and fourth rails, which were for the north side of the track, were taken into the tunnel in 1 hr. 23 min. and 1 hr. 38 min., respectively. These periods included not only the transportation of the rails, but unloading them, barring them over to the ends of the ties, spiking them at intervals, and the removal of the push cars. In addition, it required from 45 to 55 min. to place and load the cars in preparation for transporting each rail.

The first rail was started toward the tunnel at 1 a.m., August 29, and the track was cleared at 3 p.m., after the fourth rail was unloaded. While the overall time was 15 hr., only 7 hr. 58 min. were actual working time, the remainder being consumed in waiting for an opportunity to occupy the track. This overall time included the 2 hr. 25 min. necessary to load the push cars.

Immediately after the track was cleared at 3 p.m., spikes, tie plates and anti-creepers were distributed throughout the tunnel. Then an extra gang was called for 1 a.m. Thursday morning and finished laying the rail, clearing the tunnel at 7 a.m. The 90-lb. track rail was not uncoupled as released, but on each side was lined over to act as a guard rail. To provide the necessary lighting for all of these operations, except the laying of the rail, a generator was mounted on every eighth push car. This arrangement provided plenty of light for all of the men working on the rail.

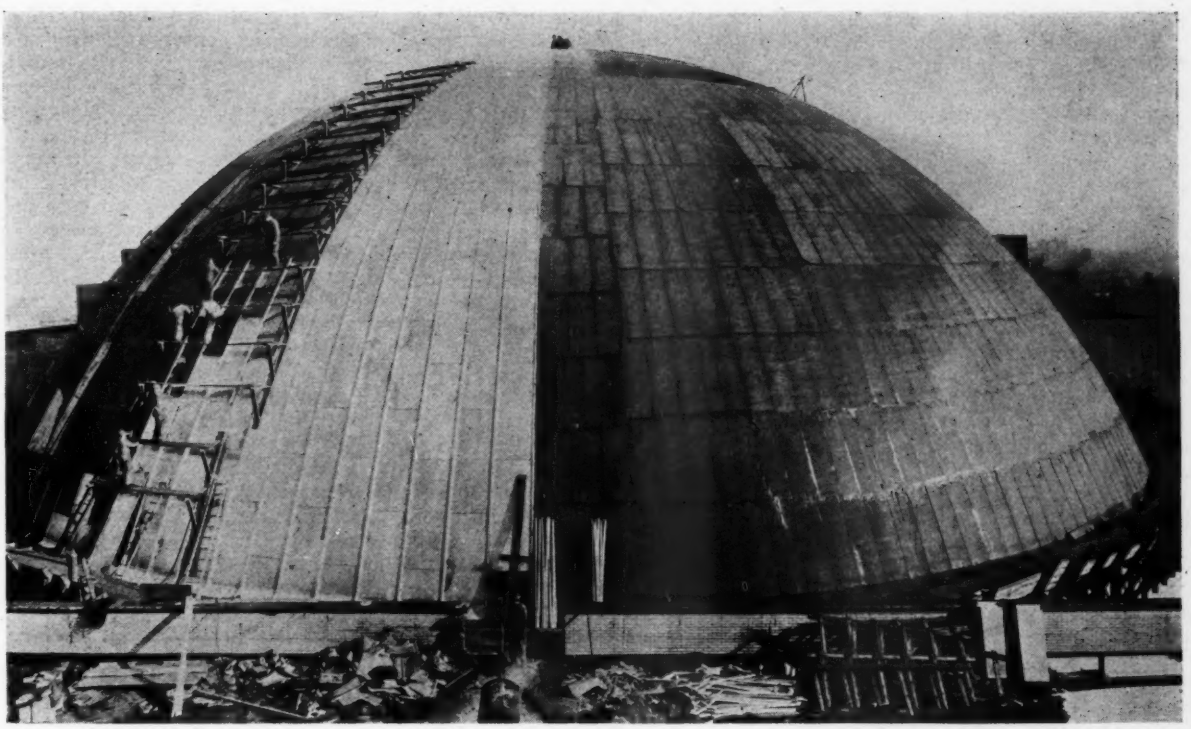
The welding of the rail was done under the supervision of The Oxweld Railroad Service Company. The entire project was carried out under the general direction of M. C. Blanchard, chief engineer, Coast lines, and under the immediate supervision of O. R. West, division engineer, and J. H. Bell, roadmaster. Neil Wilson, trainmaster, supervised the movement of the rails into the tunnel and the movement of the empty push cars out of it.

Above—Applying the Corkboard Insulation on Roof. Below—Section of the Finished Roof Showing the Staggered Arrangement of Sliding Lock Joints

# Station Dome C

THE Cincinnati Union Terminal Company recently applied approximately 32,000 sq. ft. of aluminum sheeting on the huge half-dome, barrel arch and parapet walls over the main concourse and entrance vestibule of its large passenger station serving Cincinnati, Ohio. Through the aluminum construction employed, a durable, weather-resisting surface of adequate strength and extremely light weight was obtained, but only after many special problems, brought about particularly by the curved surfaces involved, had been overcome. Not the least of these problems was the prefabrication of the roofing sheets, adequate provision for expansion and contraction, and a design that would insure watertightness under all weather conditions.

The existing roof is of concrete, supported on eight curved trusses with spans ranging from 67 ft. 8 in. to 182 ft. The half-dome area resurfaced is 192 ft. long, 95 ft. wide and 68 ft. high, having a perimeter of 300 ft. at its base. Over the concrete, a 30-lb. felt layer had been mopped in the initial construction,



Placing the Aluminum Roof Sheets, a Relatively Simple Operation After the Battens Had Been Fastened in Place

# Gets Aluminum Roof

**Cincinnati Union Terminal replaces tile roof on half-dome and barrel arch over main concourse with segmented aluminum covering. After the underlying roof surface had been carefully prepared, the prefabricated aluminum sheets were applied and firmly secured with specially designed battens and caps. The new surface, with its interlocked sliding joints, not only permits free expansion, but also insures a light, watertight, durable roof which is of pleasing appearance.**

and this was overlaid with terra cotta tile in a diamond rib pattern.

At the time the re-surfacing of this portion of the roof was being considered, a study of the available roofing materials was made and aluminum was selected. This metal was chosen not only because of its durable, weather-resisting characteristics, but also because it lent itself readily to the prefabrication necessitated by the curved surface of the roof, and to the use of a fastening design which was known to insure watertightness with ample provision for expansion and contraction. Likewise, it was known that the aluminum roof covering would weigh only one-twentieth as much as the covering replaced.

Alcoa 3-S-½H alloy aluminum sheets of 14-gage were used to cover the entire dome, barrel arch and parapet walls, except for the flatter areas at the crest of the roof, where ⅛-in. sheets were employed. Altogether, 1,140 sheet sections were used, the largest being 52 in. by 120 in. The pre-formed aluminum sheets were applied with a patented form of weathertight expansion joint, in what is known as Goodwin Batten-Type Roofing, and involved the use of approximately 11,500 lin. ft. of extruded aluminum battens and caps, ranging in lengths from 6 ft. 6 in. to 20 ft., and made from Alcoa 53-S alloy.

One of the first operations was the removal of the old roof tiles, which was done without disturbing the 30-lb. layer of felt beneath. While exposed, the old felt layer was repaired where necessary. Then, over this felt, a one-inch layer of Armstrong corkboard was mopped on, which is said to have approximately the same insulation value as the previous roofing. Over the cork, another layer of 30-lb. felt was applied, which was followed by a 15-lb. asbestos cap sheet placed with its upper surface dry.

### Special Battens Used

With the Goodwin Batten-Type roof construction, the battens are formed from extruded aluminum bars in sections somewhat in the shape of the letter "W." They are fastened to the roof by aluminum bolts passed through slots in the mid-rib of the section and screwed into expansion plugs set in the roof deck. This type of fastening is very positive, tests having shown that it can withstand a pull of 22,000 lb. The slots were provided to permit expansion and contraction of the battens in relation to the concrete base.

As shown in the accompanying cross-sectional diagram of the batten-type joint employed, the aluminum roofing sheets are lapped over the sides of the battens and are held in place by a cap. The cap, like the battens, is an extruded 53-S aluminum alloy section, but is shaped like an inverted letter "U." It completely covers the batten and the folded edges of the aluminum roofing sheets, pre-

venting the entry of water. The cap is fastened by aluminum stud bolts on 22-in. centers, screwed into the midrib of the batten. Only light tension is applied to these bolts in order to provide for the ready expansion and contraction of the roof sheeting and cap, and also to permit the sides of the cap to remain in close contact with the sheeting. All exposed batten ends are capped.

### Sheets Prefabricated

Because of the expansive curved areas involved in the Cincinnati Union Terminal roof, it was expedient and more efficient to pre-curve and prefabricate the aluminum sheets in a shop well equipped for this class of work, rather than to do it in the field. Prefabrication included making the necessary folds along the sides of the sheets for fitting over the edges of the battens. Also, the edges at the ends were folded back 180 deg. for locking with each other, the fold at the bottom end being doubled under and locking with the fold at the upper end of the contiguous lower sheet. These end folds, while serving to lock adjoining sheets together, permit expansion and contraction, effectively keep out water, and make the use of cross bars or battens unnecessary. The aluminum sheets used to cover the half-dome area required side trimming to shape them for spherical segments, in addition to the pre-forming work that was necessary on the rectangular sheets for the barrel arch.

The prefabrication work was done during the time that the old roofing was being removed and the underlying surface prepared. Careful measurements were taken of the essential dimensions of the roof and all sheets, battens and caps were fabricated accordingly. All sheets were assembled with their respective battens and caps on the shop floor, checked for accuracy before dismantling, and shipped.

### Application

Preparatory to the anchoring of the battens, after the underlying roof surfaces had been laid, holes were drilled through the layers of asbestos, felt and cork, and about 1½ in. or more into the concrete roof, for the insertion of the expansion plugs. The holes, spaced at 22-in. intervals were filled with an Alumelastic caulking compound after the expansion plugs were placed. In this connection, cinch lead sleeve anchors with zinc die-cast expanders and alumilite bolts were used. The purpose of using zinc die castings was to break any possible electric circuit between the aluminum sheets and the reinforcing bars in the roof slab, avoiding electrolytic action.

The next step in the application of the new roof surface was the bolting down of the battens on adjacent meridian lines. The aluminum sheets were then laid and the capping bolted on—the work commencing with the lowest sheet and progressing upwards until the roof segment involved had been completed. The sheets were placed with their ends interlocked, the upper sheet overlapping the lower, and with the joints staggered in adjoining meridian segments to aid in the more uniform distribution of expansion and contraction.

Since the battens on the half-dome meridian lines converge as they approach the vertex cap, it was found expedient to stop most of them before they reached that point. This was done alternately, about 25 ft. and 50 ft. from the vertex, except for every fourth batten which was carried continuously to the top. In each case, an end cap was welded on the sheet immediately above the batten end, forming a sleeve, the purpose being to avoid leakage at that point.

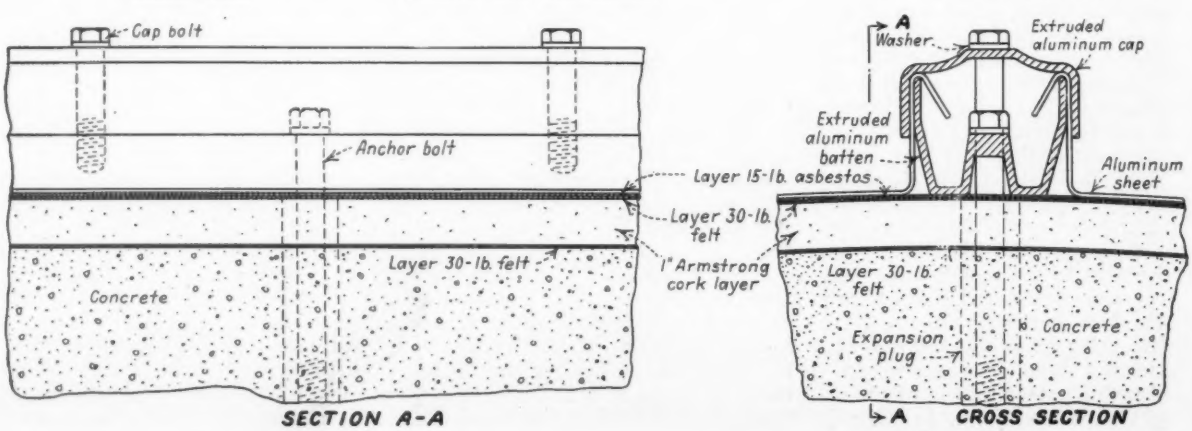
### Scaffolding

Scaffolding played an important part in the removal of the old roof tiles, preparing the underlying surface and the application of the new roof covering. Around the lower periphery of the half-dome, a shelf scaffolding was erected, with a side runway extending over the flat roof of adjacent lower story offices, which was served by an elevator for raising and lowering materials. Several ingenious types of movable scaffolding were used for the curved portions of the roof, which could be shifted laterally and vertically as desired. One type consisted of light steel channels that flexed with the contour of the roof, with brackets of the same material, spaced about five feet apart, for supporting the workmen's planks. The wide spacing of the platform supporting brackets permitted the workmen ample room for handling the large aluminum sheets and, at the same time, allowed them to reach the various bolting points easily.

Augmenting this type of scaffolding, rope ladders were used, as well as single or multiple sections of ladders suspended by ropes, which could be raised and lowered by means of tackle blocks and readily shifted laterally so that all parts of the roof were easily accessible. As much work as possible was done around the lower periphery of the half-dome employing ladders

*(Continued on page 638)*

**Above—Showing How the Caps Fitted Over the Aluminum Battens. Below—Details of the Roof Construction at the Longitudinal Joints**



# *Steel Straps* Hold Forms for Encasing Concrete Columns

**Tightening the Steel Straps Around the Forms With the Steelbinder Tool, Permitting Even-Tensioning of Straps**

A NEW method for holding forms in position for the encasement of concrete columns was given a successful trial in Chicago recently. This consisted of the use of steel straps instead of the usual form wire, and it is claimed that the steel bands not only held the forms more securely, but that they demonstrated that a smoother and more uniform surface can be obtained through their use, and that progress was also more rapid.

When it became necessary to remove the deteriorated concrete from the face of the columns of a track-elevation structure in Chicago, and apply new encasement to protect the column reinforcement, the contractor started the work using form wire, progress being at the rate of four finished columns a day. After substituting the steel straps the number of finished columns per day was increased.

Forms were made in two sections, extending half the height of the columns, the concrete at the base being placed first. After this concrete had hardened sufficiently, the form was removed, cleaned, placed on a scaffold and refitted to the top of the column. At first, when using form wire, requiring that the men work from the scaffold when placing the upper forms, these forms were placed with considerable difficulty.

With the strap method, the form was held together around the base of each column with two or three evenly-tensioned bands. After the concrete had set up, the form was released by cutting the straps, and was then cleaned. It was then returned to the base of the column, and the two halves were then re-strapped firmly, but not to full tightness, using the lower band only. It was then pushed to the upper position, where the band was fully tightened easily by a man on the ground, to hold the form in place, no shoring being needed. Then, employing a portable scaffold, one or two upper bands, as required, were applied and brought to the desired tension.

The straps used on this work were ¾ in. wide and 0.025 in. thick, and were made by the A. J. Gerrard Co., Chicago. These were applied and tightened with a device known as the even-tensioning Steelbinder tool, made by the same company. It is said that the straps and seals on this project cost less than five cents each.

**General View of the Underpass Column Repair Work, Showing the Column Forms Held in Position by the Steel Straps—Some at the Bases of the Columns and Some at the Tops**

Left Above—The Hard Spots of a Corrugated Rail Were Heated to a Blue Tempering Color. Above—The Rail a Week Later. The Part Over First Three Ties Was Not Tempered. Note That Bright Spots on Remainder of Rail Have Practically Disappeared

# Cause and Cure of Rail Corrugations*

By R. E. CRAMER

Special Research Associate Professor of Engineering Materials

University of Illinois

SEVERAL specimens of corrugated rails which have been sent to the University of Illinois laboratory for study have all shown the same characteristics, that is, that the bright spots of the corrugations are hard spots. These areas have been hardened when slipping wheels heat a thin surface layer above the quenching temperature of the steel, and this layer is quickly cooled by the metal underneath. Numerous other rails have been observed in track which show continuous hard streaks, but such rails do not receive much attention as they do not become rough. The bright hard streaks can be identified by their mirror-like or chromium-plated appearance. It is only when the hard areas are intermittent and the soft areas between the hard spots cold work lower than the hard areas that the term corrugation is applied to rails.

Microscopic examination of polished specimens from these rails show the hard layer to be from 0.001 to 0.005 in. in thickness. The hardness of such thin layers cannot be determined by standard Brinell or Rockwell testing, but the Vicker's Diamond Brinell which uses only a 10-kg. load may be used when the hardened layer is four to five thousands of an inch thick. Diamond Brinell readings of over 700 have been obtained on two specimens, which represents a standard Brinell hardness of 620. By metallographic examination, the structure of the hard areas has been found to be martensite, which can be softened by tempering to a dark straw or blue color.

To determine the effect of flame-tempering the hard spots of a corrugated rail, arrangements were made to flame treat such a rail in a freight track of the Illinois Central. The bright spots over half the length of this rail were heated to a blue color with a No. 70 Oxweld torch. One week later the rail was examined and the area which had been flame-tempered had lost practically all trace of the bright spots while the remainder was still corrugated.

Flame-tempering the rail to a blue color, which represents a temperature of about 700 to 800 deg. F., should do no damage to the rail steel as this is about the temperature at which rails are placed in control-cooling containers at the rail mills. It will have practically no effect on the hardness of the soft areas, but will materially soften the quenched martensite areas. Caution should be used to insure that the rails are not heated to a red heat, which would be harmful to the rail steel. In service, the flame-softened hard spots will soon cold work to a smooth running surface with material improvement to the riding qualities of the track.

Some railroads have grinding cars to remove corrugations. Grinding is undoubtedly the most satisfactory method of reconditioning corrugated rails as it not only removes the high hard spots but also smooths out deep wheel burns as well. However, most railroads do not have special cars for grinding rail surfaces. The method of flame treatment described is available to practically all track men and, if properly applied, could be the means of preventing the removal of badly corrugated rails.

* Abstract of a monograph by Professor Cramer, presented by a subcommittee of the Committee on Rail of the American Railway Engineering Association, of which Maro Johnson, principal assistant engineer, Illinois Central, was chairman.

# Maintaining Water Service Facilities— Water Columns

No. 18 of a Series

**In this installment, which follows the discussion of tank maintenance which appeared in the February and April issues, the author discusses in detail all of the more important factors in the maintenance of water columns and related facilities, including spouts, valves, packing, water hammer, clearance, cleaning, pits, drainage, painting and frost protection. The next installment in this series will deal with the maintenance of water treating facilities.**

By C. R. KNOWLES
Superintendent Water Service (Retired)
Illinois Central System, Chicago

THE water column has been replacing the tank spout for the delivery of water to locomotives to such an extent that it is estimated that more than 13,000 water columns are now in service at the 25,000 water stations on the American railroads.

The importance of the water column has grown as the speed of both passenger and freight trains has increased and the capacities of tenders has been enlarged. Along with the installation of many new columns, it has been necessary to make changes in many earlier water column installations to expedite the movement of trains by reducing the time required to take water. In many instances it has been necessary to raise the water columns to clear larger tender tanks; in other instances it has been necessary to relocate them, as well as to make other essential changes to insure the maximum delivery of water in the shortest possible time. Larger water columns have replaced smaller ones, tanks have been raised, larger delivery lines have been installed, and concurrent with these improvements, the standards of maintenance have been raised generally.

No details of water column operation or maintenance can be overlooked if delays to train movements are to be avoided. There was a time when a delay of less than 10 min. could not be charged to taking water. Today, trains are expected to take water in less than half that time.

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**Modern Water Column Located at Coaling Station to Permit Locomotives to Take Water and Coal With One Spotting**

When renewing flexible or telescopic spouts, care should be taken to see that the new spout is of the proper length and design. The elbow at the outlet end of the spout should have the correct angle to permit the delivery of water to tenders of varying heights without waste. An elbow with an angle that is too sharp results in waste on high tenders or where the manhole is not spotted in line with the spout, while an angle that is too flat makes it difficult to hold the spout in the manhole. The opening at the outlet end of the spout should be ample to avoid restricting the flow, because this will cause backflow and waste at the column end of the spout, especially when watering high tenders.

Balance weights or springs should be properly adjusted to the weight of the spout so that it will be held in proper position in the clear when not in use. Excessive tension on the springs or an excess of balance weights, on the other hand, will make it difficult to pull the spouts down. Rigid spouts are much simpler in construction and operation than telescopic spouts, but they cannot meet the conditions imposed by tenders of different heights and do not have the free lateral movement

of the telescopic spout. The rigid spout must be high enough to clear the coal guards on tenders, a requirement which places the spout opening so far above the manhole of the tender tank that splashing may take place, especially when filling low tenders. This can be overcome by placing a canvas boot of the required length on the end of the spout; some roads use a hinged metal extension below the elbow.

Anti-splash devices are sometimes placed in the outlet ends of spouts, which break up the flow into a number of smaller streams. These devices are effective if properly designed, particularly when used on the smaller columns, but they reduce the flow to a certain extent, and sometimes give trouble during the winter. In winter, unless guarded against, ice may form on the walls of the spout, lodge against the anti-splash device, and further restrict the flow.

### Valves

The main valve controlling the delivery of water to locomotives is the heart of the water column and requires special attention. To secure satisfactory operation and insure the required delivery of water, this valve must be maintained in first class operating condition at all times. Frequent inspection is necessary to insure that this condition prevails. The seating surfaces should be examined carefully. Slight imperfections in the seat, such as may be caused by pitting or by small particles of scale, should be repaired, because if such imperfections are neglected, serious damage to the seat may result, sometimes placing it beyond repair. A fine emery cloth or grinding compound may be used to smooth the seat, exercising care to see that too much of the metal is not removed or depressions made that will cause the disc packing, usually of leather or rubber, to seat improperly.

If the valve stem is scored or pitted, it can usually be restored to good condition by polishing it lightly with fine emery cloth. The stem should be repacked at regular intervals, all old packing being removed and the stuffing box thoroughly cleaned before applying the new packing. Adding a ring or two to worn-out packing is poor practice.

A few drops of oil on the valve stem are needed occasionally to keep the stem and packing lubricated. The valve bonnet and other parts of the valve should be cleaned occasionally, removing all dirt, scale and corrosion to keep them from getting into the valve seat. The valve lift should be checked from time to time and adjusted as often as is necessary to permit the maximum delivery of water to locomotives.

Drip valves and other parts designed to drain the column after a locomotive has taken water should be so maintained that they will operate properly during the winter, where there is any danger of freezing. They should be closed during the summer to conserve water.

**Water Column with Telescopic Spout, Showing Flexibility for Delivering Water to Low Tenders**

The lubrication of the moving parts of water columns is sometimes overlooked, resulting in excessive wear and poor operation. All moving parts, including column bearings, sheaves, valve lifting rods, fulcrum bearings and weight guides, should be lubricated with suitable grease or oil at least once each month.

### Locking Devices

The design of special locks for water columns has long been a popular pastime on many roads. Each windstorm that has resulted in blowing a water column spout out of line has usually been followed by an epidemic of powerful locking devices, although few of these have survived very long. The automatic locking devices furnished by the manufacturers of the columns are the result of many years development and experience, and if they are maintained properly they will hold the column in place during any ordinary windstorm.

Additional locking devices seldom prove of any particular benefit from the standpoint of either safety or utility, and only interfere with the normal operation of the column. In some cases their operation requires two men. In others, it is necessary for the fireman to climb down from the locomotive, unlock the column, climb back and take water, and then relock the column. High-speed trains will not permit the use of any locking device that requires additional time for its operation. The prevention of tampering with the column by unauthorized persons is sometimes advanced as a reason for providing special locks, although there is no record of any serious tampering of this kind in the past.

### Packing

Valve stems, relief valves and column pipes should be well packed at all times to avoid waste of water and to insure proper operation. Makeshift packing, such as old rubber hose, should never be substituted for the regular column packing, since the waste of water and labor involved in its use will usually offset any saving effect over the use of correctly designed packing. Well lubricated packing of an approved type should be used in packing valve stems for ease in operation and to prevent leaks. The leather or rubber packing on valve seats, relief valves, column pipes and valve governors should be inspected frequently and renewed as often as required. Prompt attention to defective packing will not only prevent the waste of water, but will also reduce repairs and avoid the possibility of trouble from the column freezing in winter.

Corrosion and pitting will occur in the lower end of the column pipe where it passes through the packing, making packing renewals necessary at frequent intervals, unless the pipe is protected in this area by a covering of non-corrosive metal. This deterioration can be overcome with plain steel column pipes by taking them into the shop, brazing the end of the pipe with bronze, turning it down to the required size, and then finishing it in a lathe. If it is so badly rusted as to require renewal, the end of the pipe may be cut off and a new piece welded on and finished by brazing.

### Water Hammer

The prevention of water hammer has always been an important detail in the operation and maintenance of

water columns and water column supply mains. This has become of increasing importance as the capacity of locomotive tenders has increased and train schedules have been shortened, necessitating higher delivery rates. The simplest method of preventing water hammer is through the use of slow-closing valves. Unfortunately, however, this type valve is not practical on main-line locomotive water columns because of the time consumed in opening and closing it. Oddly, the first three-fourths of a valve closure does not cause any appreciable increase of pressure in a pipe line, but the final one-fourth builds up the pressure rapidly and causes water hammer; instantaneous closing of a valve will create extreme pressure.

The valve design of modern water columns has been improved with the view of controlling the valve closure in such manner that the final shock of closure is somewhat lessened. These closing devices have done much to overcome water hammer, but if they are to be effective they must be maintained in good operating condition.

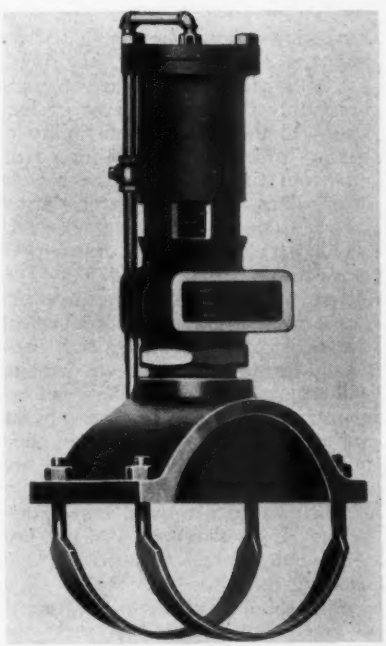
Relief valves should always be provided where long pipe lines are involved or where the velocity of flow is high. The springs of relief valves should be given careful attention as these valves allow only waves of intensity to pass through them that correspond to the tension of the springs; therefore, the tension on the springs should be carefully adjusted to each condition.

Air chambers of ample size, placed near water columns and at other critical points in long pipe lines, will do much to overcome water hammer, as they prevent the pressure waves from passing through them. Open standpipes extending above the normal hydraulic gradient offer another means of overcoming the effects of water hammer, but are rarely used.

Water column lines are seldom broken by water hammer because they are relatively short and are open to the tank so that the hydraulic shock is largely dissipated in the tank. Joints in the pipe line are sometimes blown out or loosened so that leaks occur, but as a rule little other damage is done, except where supply lines are served from the water column main. Service taps off a water-column main should be avoided, as the increase in pressure is particularly severe where the pressure wave passes from a larger pipe into a smaller pipe with a dead end, and the smaller pipe and fixtures may be badly damaged by even a moderate increase in water hammer.

From the standpoint of safety, minimum standard clearance should be maintained for all water columns. There may be cases in congested areas where the column serves other than main-line tracks, where the standard clearance may be decreased slightly, but standard clearance should always be maintained on main-line tracks.

The required clearance for main-line water columns, as established by certain state railroad commissions, is 8 ft. 6 in. from center line of track to nearest part of the column at a point 4 ft. above top of rail. This requires at least 18-ft. 10-in. track centers to permit the installation of a 12-in. water column between them. This clearance may be increased, within limits, where a column is required to serve two tracks with wider track centers. The limiting factors are the permissible length and weight of the spout without overbalancing the column, and the ability to handle the spout from the tender. In some cases where extremely long spouts are used, it is the practice to provide a support for the spout when it is not in use, to relieve the strain on the column. As a rule, however, where the track centers are greater than 22 ft., it will be found preferable to install an additional column.



**Typical Relief Valve for Water Columns to Prevent Water Hammer**

Where it is impracticable to increase the track centers to provide standard clearance for a column between the tracks, separate outside columns should be used or, if this cannot be done, the spout and water column fixtures may be mounted on a bridge. Wherever practicable, as for example on double track, spouts should be swung in the direction of traffic.

The heights of water columns may be increased or decreased as desired within limits to correspond with track changes and the heights of locomotive tenders. The permissible increase in height will be governed somewhat by the depth of the pit and the valve setting. It should not be raised to such a height that the column will be top heavy, with the result that it will be difficult to operate and to maintain in alinement.

### Pits

While water columns are designed by the builders, the great majority of them are installed by the division maintenance forces. It is important, therefore, that these forces be familiar with the design and construction of columns, as well as their maintenance. Nearly all pits are now constructed of concrete, although timber, brick and stone have been used in many older pits. Pits should be constructed strictly in accordance with the plans adopted by each road, and should be placed on good foundations. Where they are placed in fills or on soft, yielding ground, it may be necessary to provide a pile foundation, in which case four to six piles will be sufficient in most cases. Pits should be provided with an opening to permit access for inspection and repairs. This opening should be large enough to pass the valve body, in the event that it should require repair or renewal.

The water column base should be firmly bolted to the top of the pit. The valve should also be anchored in such manner that it will not shift with the movement of the column, causing misalinement and leakage. Adequate drainage should be provided in all cases.

When relocating water columns, it is not always necessary to abandon the old pit, as it can sometimes be salvaged by excavating around one side and end, and then lifting it out with a derrick or crane for movement to the new location. This practice, however, is not feasible where the pit is located between main-line tracks, because of the possibility of disturbing the roadbed.

Valve chambers, as well as the pipe lines serving water columns, should be kept clean to avoid restrictions to the flow of water through them. In many cases the carrying capacity of pipe lines serving water columns has been greatly reduced by incrustation or other deposits. This is particularly true where treated water is used. The condition of the pipe line is the prin-

cipal factor in the delivery of water through a water column. There are many cases on record where the time required to take water has been reduced from one-half to two-thirds by cleaning. Valves may be cleaned by the use of acid solvents or by dismantling them and removing the incrustation by hand. Pipe lines may be cleaned by mechanical cleaners or by the use of acid solvents.

Too much stress cannot be placed upon the importance of keeping water column supply lines clean. Special attention should be given to shut-off valves and bends in such lines, as they are not only subject to incrustation, but obstructions may lodge at these points, further restricting the flow.

### The Water Service Series

**The 17 articles in this series, published previously, include the following:**

(1) Introduction (April, 1944)
(2) (3) (4) Sources of Supply (May, June & July, 1944)
(5) The Maintenance of Pumps — Reciprocating Pumps (Aug., 1944)
(6) The Maintenance of Pumps — Centrifugal Pumps (Sept., 1944)
(7) The Maintenance of Deep Well Pumps (Oct., 1944)
(8) Miscellaneous Pumps (Dec., 1944)
(9) (10) Power Units (Jan. & Feb., 1945)
(11) Power Transmissions and Controls for Pumps (April, 1945)
(12) (13) Pipe Lines (June & Aug., 1945)
(14) (15) Valves and Hydrants (Oct. & Dec., 1945)
(16) (17) Tanks (Feb. & April, 1946)

### Painting and Drainage

One of the features of water-column maintenance that is often neglected is painting. Water columns should be kept well painted, both for appearance and as protection against corrosion. As a safety measure, it is the practice of some roads to paint their column with alternate black and white or black and yellow diagonal stripes.

The painting of the valve mechanism and other parts in the pit is one detail of maintenance that is badly neglected. As a result, these parts often rust out quickly and require frequent repair and replacement, much of which could be avoided by protecting them against corrosion by painting.

The maintaining of adequate drainage is essential to the proper operation and maintenance of water columns. Improperly drained pits allow water to accumulate in the pits, promoting corrosion and making repair work exceedingly difficult. Where water stands over the valve, valve stem and operating mechanism, excessive corrosion is certain to occur and can result only in the necessity for the premature replacement of these parts. In fact, the packing, and the adjustment and repair of these facilities are often neglected because of the difficulty of removing the water from poorly drained pits.

The drains from water column pits are not required to handle a large amount of water if the pits are waterproof and there are no leaks in the column valves or pipe lines, because the only water to be disposed of is that remaining in the columns after locomotives take water.

Drains should be so located that all water is removed from the pit. To keep the floor dry, a small sump should be located below the floor. Drain lines should have a fall of not less than 2 in. in 100 ft. They should not be less than 4 in. in diameter, and preferably 6 in. in the case of long lines. If there is any possibility of having to drain the tank through the pit from time to time, the size of drain lines should be even larger. Where drains pass under tracks, they should be constructed of cast iron or extra-heavy vitrified pipe.

Drip basins discharging into the pits are sometimes provided beneath the ends of the spouts, but these should be unnecessary, as no dripping will occur with properly designed and maintained columns. Such drip basins are objectionable because they permit surface water from rainfall and overflowing tenders to enter the pit. If such basins are used, they should be provided with screens that will prevent cinders and other debris from entering the pit.

Pits should not be used for the storage of tools, hose or other materials. Water column pits are not catch basins, and under no circumstances should waste water from other facilities be allowed to drain into them.

### Frost Protection

Frost protection is a part of good maintenance, especially in colder climates. The depth of pits should vary with climatic conditions, but in all cases the floor should be below the frost line to prevent the pit from heaving from frost, and also to secure all possible benefit from the radiation of the earth. Pits are usually constructed of concrete, which is not a good insulating material. Where extremely low temperatures occur, additional frost protection is required. One road operating in northwestern Iowa covers the tops of its pits and the upper sections of pit walls with 2-in. D. and M. lumber, and the inside ceilings and walls with 1-in. D. and M. lumber. A false cover is also placed in the manhole, with an air space between it and the regular cover.

Short, open-end drains should be trapped to prevent the entrance of cold air through the drain. This can be done by placing an elbow on the end of the drain in the pit, turning the elbow downward into a small sump in the pit floor, and thus forming a water seal. These methods of frost protection have proved effective in preventing trouble from freezing under extremely low temperatures. But the first essential is to keep pits dry.

## Aluminum Roof

*(Continued from page 632)*

standing on the shelf scaffolding. In all phases of the work, from the removal of the old surface to the placing of the new roof, the operations were commenced on the barrel arches and parapet walls and ended on the half-dome area, with the work on the latter proceeding from one side to the other.

### Recently Completed

In addition to its watertightness and durability, the completed roof presents a pleasing appearance in harmony with the remainder of this beautiful $41 million passenger terminal, and can be seen from a great distance. With its network of interlocked sliding joints, the new roof should be capable of withstanding any amount of contraction and expansion to which it will be subjected. Futhermore, its entire surface is readily accessible if emergency repairs are needed.

Much of the work on the roof was done under winter conditions since actual construction was begun on October 18, 1945, and was completed on January 31, 1946. The engineering, fabrication and installation work was done by the forces of the Overly Manufacturing Company, Greensburg, Pa., under the direction of J. C. Bussey, maintenance engineer, Cincinnati Union Terminal Company.

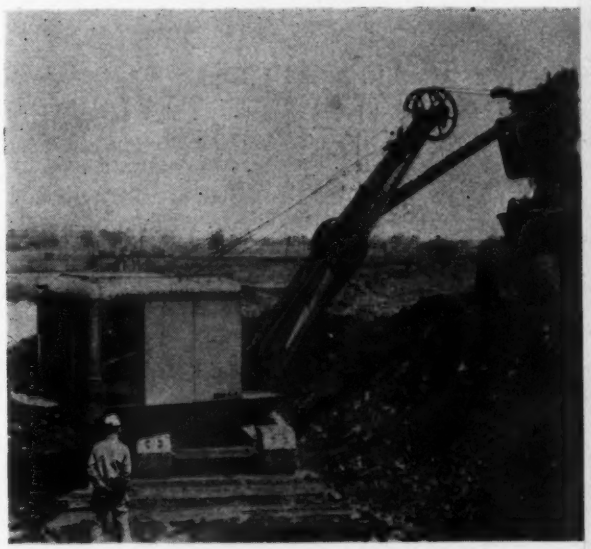
Left—Four of the Ten Tournapulls Used on the Job. Above—The Tournapull Scraper Unit at the Left Is Being Loaded with the Aid of a Pusher Tractor

# Mud Loses Battle on This Grading Job

WITH the aid of a wide variety of modern types of equipment a project involving about 600,000 cu. yd. of grading was carried out recently on the Chicago, Milwaukee, St. Paul & Pacific in 48 days, 12 less than the allotted time, despite rainfall on 18 of the first 30 working days. This work, which was performed in connection with the construction of a flat yard near Bensonville, Ill., entailed the leveling of a switching hump built about 1910, and included the removal of about 40,000 cu. yd. of refuse and scrap from an area that had been used as a dumping ground.

For the most part the terrain at the site of this project was soft, and had been made extremely muddy by heavy rains. To cope with these conditions the contractors, Thos. M. Madden Company and Thomas McQueen Company, used 10 Super C Tournapull Carryall rigs; 7 tractor-drawn LeTourneau Carryalls; 2 Trackson T7 loaders; 4 Athey dump trailers; 3 Caterpillar power graders; a 1¼-yd. Lorain shovel; a 1½-yd. Lorain shovel; a Koehring 1½-yd. drag line; a Manitowoc 2-yd. drag line; and 15 dump trucks. About 15 Caterpillar Tractors were used on the job, some for pushing the Tournapulls when loading, some for pulling Carryalls, and others with dozer blades for smoothing and spreading work.

The equipment used also included two Tournatrailer hauling units, each with a heaped capacity of 17 cu. yd., which were employed to move the 40,000 cu. yd. of refuse and scrap. These units were loaded by one of the crawler shovels and their use permitted completion of this phase of the project in about ten days.



One of the Tournatrailers Being Loaded With Refuse and Scrap of Which 40,000 Cu. Yd. Were Moved

The Tournatrailers Used Each Had a Capacity of 17 Cu. Yd. The View at the Right Shows One of Them Dumping Its Load of Refuse and Scrap

# What's the ANSWER?

## Are Slow Orders Necessary?

*To what extent are slow orders necessary when giving the track a general raise? Do shortened train schedules make any difference? The character of the ballast? The amount of the raise? If so, what?*

### Required at All Times

By O. H. Carpenter
General Roadmaster, Union Pacific, Pocatello, Idaho

Slow orders are required at all times when track is being raised out of face, regardless of the kind of ballast or of shortened train schedules. When track is raised enough so that the ballast in the cribs is placed under the ties and new ballast is applied to fill the cribs, the ballast will remain loose for several days and will lose some of its power to hold the track.

Again, where track has been newly tamped, there may be some ties that were not tamped as solidly as others, so that weak spots may show up after some trains have passed over the track. Furthermore, some provision must be made to slow trains passing over the runoff where the raise ended for the day. Obviously, flag protection is also necessary while the work is actually being done.

Speed restrictions will depend on whether the track is being skeletonized before the new ballast is unloaded. Where this is done trains should not be allowed to pass over the skeletonized track at a speed higher than 15 miles an hour. Where track is being raised on the present ballast and new ballast is applied primarily for filling the cribs and building out the ballast section, or where the new ballast has been unloaded in advance of the raise, the speed may be higher.

If the track is well tamped when the raise is made, if it is lined carefully after the raise, and if a good runoff is provided at the end of the day's work, trains may be allowed to operate at 40 to 50 miles an hour over newly-raised track. Track should always be put in condition the day following the raise so that speed restrictions can be removed. I believe, based on long experience, that slow orders should be placed on the track raised during the day and on the runoff, and for the first night and the next day after the raise is made, but that it should be lifted from this track and moved forward at the close of the current day's work.

Shortened schedules make it all the more necessary that speeds be controlled over newly-raised track.

### Situation Is Grave

By F. W. Biltz
Assistant Chief Engineer, Reading, Philadelphia, Pa.

In view of the density of traffic, the labor shortage and other adverse conditions that prevailed during the period of the war and lend-lease, it was difficult for the track forces available to raise sufficient track annually to maintain the normal cycle of surfacing and thus keep the track in shape for the speed and tonnage demands that were made upon it.

During the post-war period, at least for the immediate future, the situation facing the track forces is an even graver one. With the additional stress that is being laid on the on-time performance of both passenger and freight trains, the trend toward longer and heavier trains, the shortening of schedules, the falling off of tonnage, together with increased costs for materials, fuel and labor, with their attendant increase in operating ratios, railway management will be less tolerant of traffic delays. It will become increasingly difficult, therefore, to get

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**Send your answers to any of the questions to the What's the Answer Editor. He will welcome also any questions you wish to have discussed.**

### To Be Answered in August

1. *Should foremen be required to check ties as they are received to see that they comply with standards for quality and size? Why? If so, what action should they take?*

2. *To what extent is it feasible to employ spray painting for the exteriors of buildings? For interiors? What are the limitations? The advantages? The disadvantages?*

3. *What precautions should be taken when lining rail that is tight? Why? Does this differ for curves and tangents? Between lining in and lining out on curves?*

4. *Is there any practical way of preventing or retarding the growth of vegetation under bridges? If so, how can this be done? If not, what measures should be taken to protect the structures against fires?*

5. *What measures should be taken to insure that operators of motor cars obtain line-ups of trains? How can they know that no misunderstanding exists and that the line-up is correct?*

6. *What measures can be taken to protect earth dams from muskrats and other burrowing animals? How effective are they?*

7. *Is the use of track jacks inside the rail permissible? If so, under what conditions and with what restrictions? If not, why?*

8. *What are the advantages of power-driven trench pumps? The disadvantages? Are the former sufficient to warrant their assignment to individual bridge and building gangs?*

the track for a general raise. This will call for more careful planning and more resourcefulness on the part of the trackman than ever before.

In arranging for a general raise, first consideration should be given to the safety of the operation, and then to the economy of the work. With these two features receiving due consideration, and giving weight to the foregoing appraisal of the situation, an attempt should be made to obtain exclusive use of the track for the day. Obviously this cannot be done on single track, but can sometimes be done on double track and should be relatively easy on multiple-track lines. Failing this, the next best thing is to arrange with the dispatcher for exclusive use of the track for an hour or two between scheduled trains. Here again, the advantages will depend entirely on the density of traffic and the length of time one can get the track.

If slow orders are necessary, the schedule of raising jobs on the several subdivisions should be co-ordinated by the division engineer, so that too many slow orders will not be in effect at the same time and thus affect appreciably the schedules of the same trains. In seeking the solution to this problem it was the consensus that track can be given a general raise up to 2 in. without a slow order. This belief was based on the fact that, for raises up to 2 in. new track is safe for timetable speed, while not too much time will be consumed in making the runoff.

When raising track without a slow order, however, it is essential that special attention be given to filling the cribs, to the shoulder, and to filling the inter-track space with ballast. Such track, tamped adequately inside and out, with a satisfactory runoff, is suitable for maximum timetable speed. A rate of change in the runoff of 1½ in. per second of train travel, can be made with safety, with no shock to equipment and no discomfort to passengers.

It is necessary to establish a criterion for a runoff and then issue standard instructions on the subject, since foremen may differ in their judgment about such matters. Establishment of a fixed formula precludes the likelihood that a short runoff will shake up passengers, that it may cause the engineman to make an emergency application of the brakes or that it become a potential cause of derailment. For a raise of more than 2 in. the work should be protected by a slow order, the amount of the restriction being based on track conditions, the determining factors being the quantity of ballast in the track, the height of the raise and whether it is being made on tangent or curve.

# Preventing Water Waste

*What methods can be employed to detect and prevent water waste? Who should be responsible? Why?*

## Requires Close Inspection

By L. G. Byrd

Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

Prevention of the waste of water is so important that sources of waste should be policed constantly and immediate steps taken to eliminate these sources when they become active. Treated water always causes some hard precipitate around valves, interfering with quick shut-off and lack of uniformity of flow. This is particularly true of lime-soda ash plants.

One fertile source of waste is lack of care in laying water lines, especially under tracks, where they should be placed in a pipe or concrete conduit to take the load off them. Otherwise there is danger that the joints will open. An accurate record should be kept of the locations of all pipe lines and the dates of their renewal, and this should be supplemented by inspections at suitable intervals to determine the need for renewal. In many cases waste occurs by reason of gradual failure of the line. If it is metered, this waste can be discovered by checking the action of the meter.

On this road each water service foreman and each repairman is assigned a district. The latter is required to make monthly inspections of all of the water facilities on his district once a month, and oftener at important points. The foreman makes a similar inspection once every three months, and the bridge and building supervisor once a year. The foreman and the repairman are responsible for all water-supply installations and must read all meters monthly. They are familiar with the location of pipe lines and hidden valves which may cause waste if not inspected frequently and kept in good condition.

At terminal points the mechanical department should be made responsible for leaks that develop and for reporting them promptly to the water-service forces. On roads where the mechanical forces maintain lines and fittings above ground, they should make immediate repairs.

## Many Sources of Waste

By M. R. Bost

Water Inspector, Chicago, Milwaukee, St. Paul & Pacific, Chicago

There are many sources of water wastage on the railways, all of which should receive constant and diligent supervision, as wasted water means not only wasted money, but also often results in hazardous conditions. Following are some of the more common causes of water waste:

1. Leaks in pipe lines. In general, a leak in an underground pipe line will appear at the ground surface and can thus be detected easily. In marshy ground or in a loose fill, such as sand, gravel or cinders, its presence will not be detected so easily, although in case of a metered connection it may be possible to discover it by observing the meter. Leak-detecting equipment is available for use in locating pipe-line leakage, but some types of detectors are not suitable for use around railway properties because locomotives and other equipment interfere with their operation.

2. Leaks in storage tanks. Leaks in elevated storage tanks are usually apparent at a glance, unless they develop around the floor glands where the pipes enter the tank. In this case, however, they can be discovered readily by inspecting the inside of the frost box. Leaks through the staves and chimes of wooden tanks can sometimes be stopped by tightening the hoops or by placing patches inside the staves. A variety of materials, such as clay, Volclay or Bentonite, are effective in stopping tank leaks, especially in the floor and around chimes.

3. Flooding locomotive tenders. Water columns should be kept in good working order. If this is done there should be no excuse for this waste.

4. Unnecessary boiler washing and water changes. This is an expensive form of waste that should receive the attention of every one involved to assure that the locomotive water is the best that can be obtained and that the boiler-washing periods are exended to the maximum.

5. Drinking fountains are another source of waste that is obvious and that can be eliminated with suitable supervision. Allowing drinking fountains to run continuously is a widespread practice, especially where there are no facilities for cooling the water. This can be remedied by installing

self-closing fountain valves, and can be eliminated almost completely by cooling the water.

6. Cinder-pit hose. Allowing the hose to run continuously while not in use is another widespread practice that wastes water. It is especially prevalent during the winter to prevent the freezing of the hose. While it may be a necessary evil during the winter, it should be watched to assure that the flow is kept at the minimum and that this form of waste is eliminated during warm weather.

7. Valves. Cracked or worn stop and waste cocks and faulty valves are a source of waste that regularly requires much attention. In general, a routine inspection will show whether the facilities are in good condition or whether they should be repaired or replaced.

8. Water Columns. Faulty operation of the valve mechanism may cause overflowing of the locomotive tenders and, when failing to shut off, can cause many thousands of gallons of water to be wasted before the shut-off valve in the pipe line can be reached and closed. Failure of the main valve to seat correctly will cause much waste which will be apparent when water begins to trickle out of the spout. This source of waste can be reduced to the minimum by removing the main valve periodically and cleaning it and the valve seat. The relief valve should be adjusted to prevent water hammer, but also to prevent excessive waste.

9. Pump leakage. Leakage in a turbine pump resulting from holes in the drop pipe is not uncommon, but is difficult to detect when small, unless the pump is pulled up and the pipe is examined. Periodical pump-capacity tests in connection with electrical-load tests will give indication of trouble if the cause is holes in the column pipe, worn bowl assemblies, or both.

Responsibility for detecting and preventing water waste should rest with the maintenance man and the supervisor. Those operating the facilities and their supervisor should be held responsible for the correct handling of the equipment so that wastage will be kept at the minimum.

# Finding the Degree of a Curve

*By what simple method can one determine in the field the degree of a curve? How accurately can this be done?*

## Not Mathematically Exact

By Thomas Walker
Roadmaster (Retired) Louisville & Nashville, Asheville, N. C.

Probably the most satisfactory and simplest method of determining the degree of a curve in the field is by using the old and familiar 62-ft. chord, measuring the mid-ordinate in inches. With careful work, accurate results, say with an error not greater than five minutes, should be obtained. This is not mathematically exact, however, for the chord should be 61.8 ft., instead of 62 ft. A considerable portion of the curve should be measured off in 30.9-ft. stations. However, if the curve is about 16 deg., or sharper, 32-ft. stations will give closer results.

It should be emphasized that the results will still not be mathematically exact, since what is measured is the rate of curvature of the outside rail, not the center of the track which is the line that was used in laying out the curve. However, the difference is insignificant, being less than one minute for a 1-deg. curve and only two minutes for a 10-deg. curve, both being well within the probable errors of observation.

Instead of measuring off 30.9-ft. stations, one can use a rail length as the station length, in which case the middle ordinate is 0.13274 ft., or substantially 1.6 in., using the string over two rail lengths. This saves the work of measuring the stations and, if no tape is available, is convenient. One must guard against short rails, although they are seldom found on the outside of curves. This can be detected by stepping them off. If the rail is used for station length, it is best not to mark the station location immediately at the joint, since a kinked joint will give an incorrect reading.

A thin, strong cord will give more accurate results than a thick line. In either event, however, one should always read the length of the ordinate to the side of the line nearest the rail, not to the middle of the line. Care should also be exercised to hold the rule level, not parallel to the tie, for if the curve has much elevation there is a tendency for the line to sag toward the center of the track.

There is another very old method of finding the degree of a curve in the field, which requires no measuring devices. This consists of sighting a chord from the gage side of a joint on the outer rail, tangent to the gage side of the inner rail and extending it to an intersection with the outer rail. Count the number of 39 ft. rails between the point of sighting and the point of interception. Then by using the following table the rate of curvature can be found.

| Degree of curve | Length of arc feet | No. of rails subtended |
|---|---|---|
| 1 | 464.4 | 11.9 |
| 2 | 328.4 | 8.42 |
| 3 | 268.2 | 6.87 |
| 4 | 232.3 | 5.95 |
| 5 | 207.8 | 5.33 |
| 6 | 189.7 | 4.86 |
| 7 | 175.7 | 4.50 |
| 8 | 164.4 | 4.22 |
| 9 | 155.0 | 3.97 |
| 10 | 147.1 | 3.76 |

Theoretically this method is accurate, provided the curve is in good line. In practice, accuracy will depend on how well one can sight the chord and determine just where the line of sight intercepts the outer rail. Probably the best way is to place some suitable sight on the gage side of the rail, moving it back or forth until it lines up with the inner rail and with a joint at the far end of the chord. The distance from the point of sighting to the next rail joint can be stepped off, or measured if a tape line and a man to hold it are available.

This is an excellent and accurate method of finding the degree of the curve, if a transit is at hand. It has the advantage of being quick and covers enough of the curve to give a fair average. A disadvantage is that one does not always have a table at hand. This can be overcome without taxing the memory if one will remember that the number of 39-ft. rails in a 1-deg. curve subtended by the chord is 11.9. Square this (11.9 x 11.9) and divide this by the square of the number of rails subtended by the chord on the curve being checked.

If one remembers the figure 11.9 for 39-ft. rails, the length of the arc can be figured and the number of rails of any uniform length calculated for a 1-deg. curve. The same calculation is then used for the length of the rail in service.

## Select Several Points

By B. A. Bates
Engineer Industrial Development, Central of Georgia, Savannah, Ga.

Curvature may be determined by means of a string and a rule. The ends of a string 62 ft. long are held against the gage side of the outer rail, and the middle ordinate, that is, the distance between the string at its midpoint and the gage of the rail, is measured with the rule. This measurement,

in inches, indicates the degree of curvature at that point. To illustrate, if the distance is 3½ in., the curve is one of 3 deg. 30 min. The points selected for the measurement should be far enough in on the curve to be off the spiral. Several points should be selected for test, since the curve may be slightly out of line, and the average of the several measurements should be used in making the final determination of the rate of curvature. While this method is not mathematically exact, it is sufficiently accurate for all practical purposes. On light curves, provided the field work is done accurately, the error will not exceed 0.2 of 1 per cent.

### Cites Two Methods

By J. P. Hiltz
Engineer of Track, Delaware Lackawanna & Western, Scranton, Pa.

Possessing the necessary equipment and having three men, the degree of curvature can be determined accurately and easily by the stringline method. Using 31-ft. stations and a 62-ft. chord, the middle ordinate, read in inches, will indicate directly the curvature in degrees; or by using 22-ft. stations and 44-ft. chords, the reading of the mid-ordinate in half inches will give the same result. Likewise, 11-ft. stations and 22-ft. chords will give the same result when the mid-ordinate is read in one-eighth inches. However, the longer chord will give results of greater accuracy.

A highly approximate method is to stand over the gage line of the outside rail and sight over the gage line of the inner rail. Note where this line of sight intersects the gage line of the outside rail, then count the number of 39-ft. rails between the point from which the sight was taken and this point of intersection. Square the number thus obtained and divide the result by 144. The quotient will be the curvature in degrees. It must be stressed that this method of obtaining the curvature is highly approximate.

### Accuracy Depends on Care

By R. W. Putnam
Assistant Engineer Maintenance of Way and Structures, Southern Pacific, San Francisco, Cal.

A simple method of determining curvature, one that can be employed by almost any trackman, is to measure the mid-ordinate to a 62-ft. chord. The only tools necessary are crayon, a string, a tape line and a ruler. Measured in inches, the distance between the mid-point of 62-ft. chord and the gage line of the rail represents the degree of the curve. Very accurate results can be obtained by the string method.

Where it is desired to make a record of the curvature, the usual method is: first, to mark with a crayon on top of the rail at every 31-ft. point around the curve, numbering these stations 1, 2, 3, 4, etc. Then by measuring the mid-ordinate at each of these stations, that is, the distance between the string, held against the gage line of the outside rail, and the gage line of the rail, accurate information can be obtained as to the degree of curvature every 31 ft. around the curve. However, the degree of accuracy attained will depend on the degree of care with which the measurements are made. If care is exercised, the curvature at each point can be determined within one-eighth of a degree, 7½ min., or ⅛ in. on the ruler.

On sharp curves, or to determine the curvature at short pockets in the line on lighter curves, the mid-ordinate should be taken for chords 31 ft. long, or every 15½ ft. In this instance each quarter inch of the mid-ordinate will represent one degree of curvature.

A quick method is to take a 62-ft. string, tie a knot or fix some other marker at the center, place one man at each end of the string and one at the middle to take the measurements at any point desired without reference to station markings or stopping to measure around the curve. This can be done almost as fast as one walks around a curve naturally, and is accurate enough for all practical purposes, provided the objective is merely to find what the degree of the curve is.

# Advantages of Flue Linings

*What are the advantages of flue linings? The disadvantages? Is it worth while to apply them where not required by ordinance?*

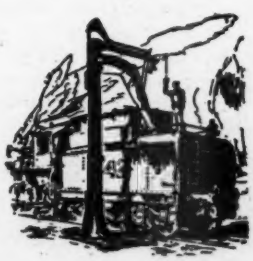
### Helps Stiffen Chimney

By L. G. Byrd
Supervisor Bridges and Buildings, Missouri Pacific, Poplar Bluff, Mo.

I consider a flue lining to be of considerable importance in a brick chimney, both from the standpoint of safety in stiffening the chimney, and of providing a smooth inside surface. It is our practice to use them irrespective of location. Where the walls of the flue are not more than 8 in. thick, there is always danger that an opening may be left between the layers of brick which will allow sparks to pass through and destroy the structure. This has happened many times, whereas a flue lining at small cost would have prevented this loss.

All chimneys should extend to the ground and rest on concrete foundations, while the size should not be less than 8 in. with the use of the flue lining. If the flue is at the side of the roof it should extend at least 2 ft. above the top of the roof, but where it must extend 6 ft. or more above the roof the walls of the chimney should be not less than 12 in. If more than two stoves, each requiring 6-in. pipe, enter the flue, the lining should be 8½ in. by 8½ in. in interior dimensions. The failure of many heating plants may be traced to insufficient draft to burn the fuel at the rate required to run the boiler or furnace at its rated capacity.

Flues should be free of any features that will prevent the full area to be available for the passage of gases. Flue linings will eliminate rough and hanging mortar which is often found where full linings are not used. All joints between the flue walls and the flue lining should be cemented tight. The top layer of bricks should be laid in cement mortar to prevent the acid fumes from the fuel and the rain from cutting out the joints, which often happens where lime mortar is used.



### Reduces Fire Hazard

By General Inspector of Buildings

By all means flue linings should be installed wherever a brick chimney is built, regardless of ordinance requirements, for without a flue lining a chim-

ney sooner or later becomes a fire hazard. Constant heat from the fire, the attack from gases of combustion and the action of the weather combine to destroy the mortar, so that it falls out of place, eventually leaving holes or cracks in the chimney. Settlement also may cause cracks. Being out of view, these openings are seldom detected until a fire has resulted because of them.

Flue linings also improve the draft by presenting a smooth surface, and thus reduce the chance of chimney fires; they cost little; are easily installed; and stiffen the chimney.

# Where to Tamp Ties

*How far inside the rail should ties be tamped? How far outside? Why? Does the amount of the raise, the size of the tie or the kind of ballast make any difference? Should the tie be tamped from one or both sides? Why?*

### Tamp Solidly Under Rail

By J. B. Bragg
Section Foreman, Chesapeake & Ohio, Carlisle, W. Va.

Ties should be tamped solidly under the rail and for about 10 in. inside the rail depending on the amount of raise. Outside the rail, the tamping should be done from the opposite side of the tie, if the tamping is done with picks, clear to its end. The kind of ballast and the amount of raise have an important bearing on how the tie should be tamped. However, it is not clear that the size of the tie has very much, if any, influence on how the tamping should be done with respect to the distance from the rail.

If the tamping is being done with picks, it should be lock tamped. If the track is being surfaced out of face, with a generous raise, all ties should be tamped from both sides, particularly if the tamping is being done with shovels. The original as well as the follow-up tamping is an important factor in the maintenance of good surface and, for this reason, should be given careful attention to insure that it is done uniformly and well. However, very high lifts are not conducive to either good or uniform tamping.

### Tamping Must Be Uniform

By C. R. Schoenfield
Roadmaster, Chicago, Burlington & Quincy, Aurora, Ill.

Uniform tamping should be considered as essential to any set of rules for tamping ties. The foreman on the job is the only man who can control this, regardless of what kind of tools are used to do the tamping. To overtamp one tie is much more serious than the poor tamping of one tie, and the foreman must know this and know when a tie is overtamped before he can control the tamping.

In most cases one-minute tamping is superior to one hour of tamping on the same tie. There is a point in any kind of ballast where a tie is tamped, and it is a waste of time as well as a possible hazard to continue beyond this point. When raising track more than 3 in. on ballast less than 2½ in. in size, all that is necessary to insure a good surface is to put the ballast under the ties uniformly. Then the first train over it should be held down to 30 miles an hour.

It has been my experience that, regardless of how much time is spent on tamping with shovels or tamping machines, some smoothing up must be done following the original surfacing. This is one thing that never should be neglected, since it is the most important part of the surfacing job. Any man can raise a low spot, but it takes an experienced man to do the job right.

In high-speed territory where heavy locomotives are operated, care must be taken in tamping the centers when surfacing track. If the center tamping is kept up with the end tamping, the tamping can be expected to be uniform from the end of the tie to as far as the tamping is done inside the rail. If the ends are tamped and the area inside the rail is left until later in the day, and traffic has been allowed over it, there will be some settlement on the end tamping and there will be more settlement before the tie comes to a full bearing on the inside tamping.

In addition to the local conditions that must be taken into account, one must give consideration to the following factors: the weight of the rail; the kind of ballast; the kind of ties and their length and cross-sectional area; the tie spacing; the crown of the subgrade; the kind of material in the roadbed; the speed of trains; and the kind of tools with which the tamping is to be done. When each of these factors has been given due weight, one is in position to decide how the inside tamping should be done.

# Concrete in Cinder Pits

*What measures can be employed to protect the concrete in cinder pits from injury from the operation of clamshell buckets when removing cinders?*

### Punishment Is Severe

By V. E. Engman
Chief Carpenter, Chicago, Milwaukee, St. Paul & Pacific, Savanna, Ill.

Regardless of how carefully the bucket may be handled, the concrete in cinder pits is almost certain to receive severe punishment where the cinders are removed by means of clamshell buckets. It is difficult to devise any form of protection against damage from this source in existing pits that were built before clamshell buckets came into their present wide use for cinder disposal.

We have obtained satisfactory results in pits that were built more recently, by embedding released rails in the concrete. These rails are placed vertically in the walls on 1-ft. 8-in. centers, and longitudinally in the floor on 1-ft. centers, in both cases with the heads protruding ½ in. beyond the surface of the concrete. Holes are provided in the webs of the rails for the purpose of anchoring them securely to the reinforcing bars in the concrete. The inside top edges of the walls are protected with 5-in. by 4-in. by ½-in. steel angles fastened to running-rail plates, and this angle also serves to protect the rail-anchor bolts and clips.

### Not Solved Entirely

By General Inspector of Buildings

This is a problem that has not yet been solved entirely, although conditions at most of our later pits are now generally quite satisfactory. The earlier cinder pits that were built before the clamshell was a factor in cinder disposal are now mostly retired or are on branch lines where clamshell buckets are not available for cin-

der disposal. For this reason, we will dismiss them, although it may be said in passing that we never succeeded in devising any form of protection against the damage occasioned by the use of clamshell buckets, that even approached being effective.

Our later pits are of the water-quenching type with deep reservoirs that hold more than enough cinders per engine length to fill an ordinary cinder car. Thus, in loading them, the bucket comes into contact with the concrete surfaces only a part of the time. At our larger terminals we construct the pits in pairs, each generally long enough to accommodate two modern locomotives, with a loading track between them, and install a gantry crane and a clamshell bucket for clearing the cinders out of the pits. At less important terminals we have only one pit and the loading track, but wherever we install the water-quenching pits we also install the gantry crane and bucket.

For several reasons an ordinary mobile crane is not satisfactory for keeping cinder pits clean at a busy terminal. One of these reasons is that too many persons around the terminal have jobs for it, and another is that a bucket at the end of a swinging boom is not quite so easily controlled as one that is operated from a gantry crane. The result is that the damage to the concrete surfaces by the mobile crane is greater, even when every effort is made to provide protection.

Our experience indicates that the best form of protection for the concrete surfaces is the embedment of ordinary rails in the concrete, so placed that the head protrudes from ⅜ to ½ in. beyond the surface. We have found that we get better results from the use of the larger rail sections, because they can be anchored more easily and more firmly than the lighter sections, primarily because of their greater height. We place them vertically in the walls, spacing them about 15 in. on centers, and on 12-in. centers in the floor. Even with this closing space, it is not possible to avoid some damage to the concrete, but this is seldom serious since it does not extend far below the plane of the tops of the rails.

# Hack Saws Versus Chisels

*What are the relative merits of hand-operated hack saws and track chisels for cutting rails? Power saws? Does the size of the rail make any difference?*

## Weight No Difference

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

When I started railroading, power saws were not available for cutting rails out on the line, and our regulations provided that when a rail was cut it should be sawed all the way through with a hand-operated hack saw. Some blades were poor and some rails were hard, so that sawing a rail all the way through could not be timed very closely. I found, however, that I could saw a straight groove across the head of the rail to be cut, and then by selecting a sharp, hard-tempered chisel, and striking the chisel with a light hammer, the outer fibres of the rail could be cut to true lines, resulting in a perfectly straight break. No superior officer ever detected that these rails had not been sawed all the way through. This method was a time saver, compared with sawing the rails by hand, but still it might delay operations.

When the time for making a connection was limited, I tried cutting a rail in the track. A slit about one-half inch deep was sawed hurriedly in the toe of the base and, while a strain was put on the rail with bars, the fibres adjoining the slit were cut with a sharp chisel, and the rail broke perfectly. Much more time was saved, although the ends of the rails at such breaks could not be used against end posts in insulated joints. This was overcome by using mill-sawed ends in such joints.

If power saws with modern blades had then been available, none of the foregoing methods would have been tried out, because now a power saw can be set up on the rail to be cut and, by the time the short rail is needed, it is ready, and can be used against end posts. We have been cutting rails as large as the 131-lb. section with power saws and cannot see that the weight of the rail makes any difference, except that, other things being equal, the larger the section the longer it takes to saw it. Neither did the weight of the rails make any difference with respect to the methods of cutting rails that have been described, except when the cutting was done with hand-operated hack saws.

## Too Slow for General Use

By C. M. Chumley
Engineer Maintenance of Way, Illinois Central, Chicago

Hand-operated hack saws will produce a good clean cut, which may not be square, however, but they are too slow for economical use. Power-operated saws will give a good, clean square cut, and are the most satisfactory on the basis of both quality and economy. The hack-saw type of power saw is preferable to the circular type, since the latter may heat the surfaces sufficiently high to cause thermal cracks.

The chisel method is fairly quick, but requires more men for handling the rail and the break is usually not square or smooth, while it involves a greater hazard of personal injury.

The size of the rail will make some difference in the time consumed in making the cuts, with either the hand-operated or the power saws. It will make little, if any, difference when cutting with a chisel.

## Power Saw Superior

By Malcolm E. Condon
Track Supervisnr, Erie, Campbell Hall, N. Y.

Of the three methods mentioned in the question, the power saw is immeasurably superior for cutting rails, but from an economic standpoint such a saw cannot be provided for each section gang or, generally, for each supervisor's district. For this reason, when it becomes necessary to cut a rail in an emergency, unless the power saw is immediately at hand, either the hand-operated hack saw or the track chisel must be employed to cut the rail. With the hand saw, it will require two men, taking turns, from 28 to 30 min. to cut a 112-lb. rail. The ends of the rail at the cut will be relatively smooth and can be faced off easily and quickly with a rough file. This method is particularly satisfactory where the piece to be cut off is 3 ft. or less, or where an insulated joint is involved.

If the track chisel is used, from 18 to 23 min. will be required to make the cut, with the squareness of the cut always in doubt until it is com-

pleted. Even if the cut is square, the resulting end surface cannot be used in an insulated joint, but, obviously the rail can be turned to bring the mill-sawed end into this joint. When cutting off a piece three feet or less in length, the probability of an irregular break increases when using the track chisel. There are also a number of hazards in the use of the chisel that are absent where the saw is employed.

Comparing the time element for these three methods—the hand-operated hack saw requires from 25 to 35 min., average 28 to 30; the chisel, from 15 to 25 min., average 18 to 23; while the cut can be completed with the power saw in 5 to 8 min., under average conditions. From the foregoing facts it is evident that the power saw and the hack saw are superior to the track chisel with respect to the quality of the cut, but that the power saw reduces the time necessary to make the cut, compared with the other two methods. It should be realized, however, that the track chisel is not outmoded, and that it still has a very definite place as a tool for use in the cutting of rails.

The practicable arrangement for cutting rails on a subdivision should include a power saw for all programmed work, where accurate cuts can be arranged for or determined in advance by accurate field measurements. It should also include provision for a hack saw with spare blades and a sufficient supply, say two, of track chisels at each section tool house. These would be for general use or in emergencies, when the power saw is not available or where its use is impracticable.

### Power Saw Is Ideal

By H. S. Ashley
Engineer of Track, Boston & Maine, Boston, Mass.

Trying to cut a rail with a hand-operated hack saw is an operation that should not be attempted. At times and under certain conditions, the cutting of a rail with a track chisel is satisfactory and safe, provided it is done correctly and is supervised adequately. The ideal method is to use a power saw, in which case the size of the rail does not make any particular difference, except that it will take longer to make the cut on the heavier sections. On connection work a power saw is a real necessity and, if the work is planned suitably, one saw assigned to each supervisor will generally be sufficient to meet all demands.

# Characteristics of Priming Coats

*What essential characteristics should priming coats for steel surfaces possess? Body coats? Finishing coats? What is the importance of each?*

### Must Use Good Vehicle

By G. S. Crites
Division Engineer, Baltimore & Ohio, Baltimore, Md.

It is essential that, before a priming coat is applied to a steel surface, the surface be clean and ready to receive the paint. Otherwise no kind of paint will do any lasting good as a priming or other coat. The vehicle of priming coats is the keystone of the arch of satisfactory paint jobs. It should spread easily in a uniform adhesive film and dry consistently fast to avoid gathering dirt and flying insects. It should also resist abrasion, retain its initial properties, remain flexible and have tooth to enable the body coat to adhere.

First-grade linseed oil has all of these characteristics, but the Chinese found out centuries ago that lac, china-wood, tung and soy-bean oils have these properties almost to perfection. In the absence of these Far Eastern products in recent years, our own industries have perfected synthetic paint vehicles that are good. Old timers, however, still prefer the tried and proven linseed oil as a vehicle.

While the pigment is not so important as the vehicle for the priming coat, red lead has long been used with satisfying results, and now metallic dusts, such as those of zinc and aluminum, are holding up well. The pigment should be of such character that it will not interfere with good vehicles during or after application.

Cover coats are to give body and appearance and to protect the priming coat. They must resist weather and wear, and the pigments must be rust resisting. The Chinese oils make good vehicles for cover coats and some of the synthetic vehicles are good. However, here again, linseed oil has proven its worth for cover coats and, when cut to proper consistency with turpentine, gives satisfactory results.

Where salt air or brine drippings must be contended with, it is well to protect the body coat with an asbestos-asphalt or an asbestos-tar covering. Both the tar and the asphalt can now be prepared so as not to have a sticky surface when mixed with asbestos and used as a protective seal coat. Greases are messy for this purpose.

### Should Inhibit Rust

By General Bridge Inspector

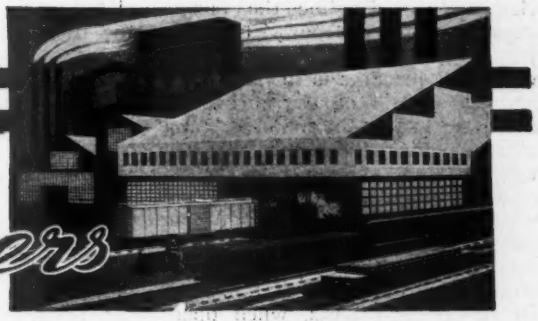
Paint applied as a priming coat to steel surfaces should adhere to the metal both when green and after it has dried. While this is an essential characteristic for the paint, no paint can fulfill its mission as a protective coat unless the metal surface is in condition to receive it. For this reason, the surface to which the paint is to be applied must be clean and dry; it must be free of scale, dust or other loose particles of any kind, as well as of grease and alkali.

Three elements of paint that is to be used as a primer for steel surfaces are of basic importance. First, the vehicle must be highly resistant to the effects of the weather and elastic enough not to be damaged by the expansion and contraction of the steel under extremes of temperature. On its part, the vehicle should be an inhibitor of rust. The paint that most nearly meets these requirements is linseed oil and red lead. It goes without saying, however, that both must be of good quality. The priming coat for steel surfaces does not need to have an excess of oil, which is necessary for the primer for wood surfaces, since the metal does not absorb the oil as the wood does.

Body and finishing coats should be mixed with inert pigments, which should be present in slightly lower ratio to the volume of vehicle than in the priming coat. The body coat should spread thin, with the addition of turpentine, be opaque and dry with sufficient tooth to hold the finishing coat. It should be elastic, for temperature changes in the steel may result in a considerable range between extreme expansion and extreme contraction.

The finishing coat should be of the same material as the body coat, such as linseed oil and lamp black, if the coat is to be dark, or linseed oil and white lead, if a white surface is desired. It may be wise to mix a small amount of coloring to differentiate the two coats until the finishing coat is completed. However, less thinner is required, for it is desirable that the outer surface of the paint be glossy, since experience has shown that a glossy surface will resist chalking for a much longer time than a rough or flat surface.

# PRODUCTS of Manufacturers



## Floor Repairs

THE Stonhard Company, Philadelphia, Pa., has developed a material expressly designed for repairs to railroad floors, which is said to be practically indestructable, even on floors subject to heavy service, such as in car shops, roundhouses and the like, where rough, broken floors endanger personnel and equipment and reduce operating efficiency. This material, which is also impervious to oils, greases and live steam, is supplied ready for immediate application, requiring no mixing or additional materials. Applied in a thickness of 1/3 in., it is said to bond securely to the old surface and to set in a few hours.

## Thor Impact Wrench

A NEW Thor pneumatic impact wrench for driving and removing nuts, bolts, and cap screws up to ⅜-in. thread size, has been placed in production by the Independent Pneumatic Tool Company, Chicago. This wrench, with a length of 6 in. and a weight of 3¾ lb., is said to be the lightest such tool in its class, and to embody a new impact mechanism in which all springs, gears, and fastenings have been eliminated, and which provides a direct, positive drive to the impact spindle. Torque reaction to the operator is said to be practically eliminated.

Thor Pneumatic Impact Wrench

The impact jaws are set at a relatively wide radius to the spindle center, a feature that is said to reduce stresses in the working parts. Also, because a new face for each jaw is rotatively delivered to the anvil for each blow, the impact jaws are said to wear longer and evenly, thus retaining full striking power.

The Thor wrench is a one-hand tool with a pistol grip. A trigger throttle controls the motor which may be reversed by pressing a conveniently located side button. For vertical suspension work, a lever throttle is available. Lubrication of the motor is automatic, an oil reservoir in the handle feeding the proper amount of lubricant to the motor with the compressed air. The wrench is to be produced in the near future in larger models with capacities of 1 to 1¼ in.

## Thew Shovel TL-20

THE Thew Shovel Company, Lorain, Ohio, has placed a crane on the market known as the TL-20, which is said to embody many new engineering and design principles. With it, a choice of five interchangeable booms and ten different types of mountings can be had, which enables it to meet a wide range of off-track job conditions as a shovel, trench hoe or dragline, or as a lifting machine. It is a single-engine, self-propelled crane, except in what is known as the Moto-Crane rubber-tired model, which has two engines, one for propelling the machine and the other for operating the turntable or superstructure.

The TL-20 may be powered by either a heavy-duty Waukesha gasoline engine or a Caterpillar Diesel engine. The gasoline engine is a 6-cylinder unit rated at 63 hp., while the Diesel engine is a 4-cylinder unit. On the Moto-Crane, the propelling engine is a 6-cylinder Waukesha gasoline engine rated at 83 hp. The crawler mounting is a chain-driven unit with two speeds in both directions, and it can be steered in either direction with the turntable in any position of swing. The rubber-tired mountings cover all combinations and types in both four and six-wheel units, with or without front-wheel drive.

Thew TL-20 Crawler-Mounted Shovel Has Independent Crowd and Retract Cables to Maintain Strong Digging Force

As a shovel, the machine is equipped with a ½-yd. dipper. As a

A 6-Wheel Unit of the Thew TL-20 Moto-Crane Equipped With Clamshell

clamshell or dragline the bucket capacity will vary from ⅜ to ¾ cu. yd., depending upon the radius at which the machine is to be worked and the weight of the bucket required to handle the material. As a trench hoe, the unit may be equipped with a dipper having a cutting width of either 30 or 36 in. When crawler-mounted, the lifting capacity of the machine as a crane is 7 tons at 10-ft. radius, while this capacity is increased to 9 tons at 15 ft. radius on all rubber-tired units, when operated with outriggers.

An important feature of the TL-20 is said to be the unit assembly principle employed, which enables each major component—the clutch shaft, the cab, the hoist shaft and the engine and accessories—to be removed as a unit and replaced with a similar complete unit. Turntable features include one-piece, all-welded turntable beds, anti-friction bearings, cut gears throughout in constant oil bath, and interchangeable shoe-type clutches. Equipped for lifting purposes, the crane has a two-piece, all-welded boom, in which center sections can be inserted readily to increase its length. On the all-purpose boom, two sets of sheaves are provided, arranged in tandem, to produce a modified "hammerhead" boom which offsets the cable leads so that the loads cannot foul the boom even on high lifts. On the shovel, the boom and stick are both electrically welded steel units, the stick sliding in a shipper-shaft sleeve which is lined with adjustable, hardened wearing blocks.

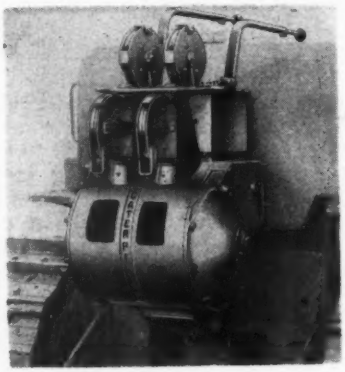
Standard equipment on all TL-20 models includes a starter, generator, hand fuel pump, operating lights, safety glass and a swing brake.

## Rear Cable Control

MANUFACTURE of a new double-drum rear cable control for use on Models D6, D7 and D8 of its line of Diesel tractors has been announced by the Caterpillar Tractor Company, Peoria, Ill. Designated as the No. 25, the new unit is designed for the heavy service imposed by the operation of large scrapers and of bulldozers and rippers. Large-capacity drums holding 225 ft. of ½-in. cable provide an adequate cable reserve.

It is said that the operation of the new unit is smooth and easy with a minimum of adjustments. The control has a metallic-faced, multiple-disc clutch of the same type as that used for many years on the company's track-type tractors. Synchronization of the brake release and clutch engagement is said to add to the ease of operating the control. Other features of the new unit include large-diameter, specially-grooved sheaves, anti-friction bearings, compact design, large brake capacity and a rugged cast steel case for protection against distortion.

Included in the specifications of the control are a sheave diameter of



Caterpillar No. 25 Rear Cable Control

9¾ in.; 732 sq. in. of friction surfaces for each clutch; an effective brake area of 160 sq. in.; and molded brake linings.

## Post-War Auto-Railer

THE Evans Products Company, Detroit, Mich., has announced two post-war models of its dual purpose rail and highway vehicle, the Evans Auto-Railer. These vehicles are of conventional truck or station wagon design and are equipped with retractable flanged steel pilot wheels in front and rear for holding them on the track. When used on the highway, the pilot wheels are raised by a hydraulic retraction gear operated by controls from the driver's seat.

During 1946 the Auto-Railers will be produced in two models, a 1½-ton stake-body maintenance of way truck, and a steel bodied ¾-ton inspection truck—with interior finishing in the latter model said to be similar to that of a deluxe station wagon.

Engineering improvements over earlier models include a 1/3 reduction in overall weight, a full-speed reverse gear for rail operation, and a simplified hydraulic retraction gear for the pilot wheels. Special tires, said to give maximum traction on wet rail, are provided.

## Roof Protection

THE Acorn Refining Company, Cleveland, Ohio, is introducing into the railroad field on a broader basis its line of roof-protection compounds, of which the principal product is Nuroof. Companion products are Plastiklast, Nuroof primer and Nuroof patching fabric. Designed for the protection of all kinds of roofs, both old and new, from leaks, decay and corrosion, Nuroof is a thick, black, semi-liquid compound composed of refined asphalt, gilsonite and long staple asbestos fiber, fused with special non-drying oils. It is said to form a tough, fibrous, one-piece mat, free from laps and joints, over any surface, and is claimed to remain pliable and elastic, permitting it to expand and contract with rapid changes of temperature without its protective qualities being impaired in any way.

To apply Nuroof, the existing roof surface is cleaned and necessary repairs are made on worn spots, split seams, flashings, skylights, etc. No mixing or special handling is required and the product is applied cold with a stiff, long-handled roofing brush, a gallon or so being poured out at a time and spread into a heavy even

One and One-Half Ton Post-War Auto-Railer Maintenance of Way Truck Ready for Operation on Railroad Track

coat. It is said to produce a waterproof covering on all common types of roofing surfaces, such as metal, paper, composition, gravel or slag.

Because of the asphalt used in Nuroof, it is said that the product is not affected by temperature changes and that it neither runs in hot weather nor becomes hard and brittle in cold weather. Aside from its use for protecting roofs, Nuroof is said to be effective for waterproofing foundations and as a wood preservative.

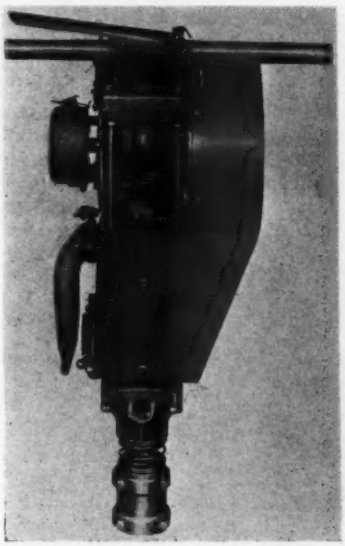
Where the existing roof must be patched and repaired before application of Nuroof, Plastiklast and Nuroof patching fabric are used. Plastiklast is composed of the same ingredients as Nuroof, but is in a heavy-bodied plastic form. This product is applied with a trowel or wide-blade putty knife and is said to spread freely and evenly. It is a waterproofing compound designed for use in resurfacing new or old roofs, but is principally used for patching and repairing holes, gutters, flashings, tops of parapet walls, cracks, brickwork, masonry and skylights on all types of roofs. The patching fabric is a heavy cotton cloth saturated with pure asphalt, and is said to provide a practical, durable covering for an entire roof if the need for such a covering is present. However, it is more generally used as a seal coat for large holes, cracks, metal seams or worn and weak areas on roofs, and for this purpose is applied in connection with Plastiklast.

On worn roofs of asphalt shingles, roll roofing, composition and concrete that are dried out, it is recommended that the surface be given a coat of Nuroof primer before applying Nuroof. This product is a heavy paint made from a base of refined liquid asphalt, fused with waterproof and penetrating oils. Aside from its use as a "first coat" it is also said to act as a good resaturant, since it is penetrating and elastic and can withstand contraction and expansion without cracking.

## Gasoline Spike Driver

THE Syntron Company, Homer City, Pa., has introduced a portable, gasoline-powered hammer spike driver, weighing 92 lbs., which is said to be entirely self contained, requiring no battery, coil, cable or other auxiliary equipment. The new spike driver is designed around the Syntron gasoline hammer paving breaker, the principal modification being in the tool-retaining casting, at the nose end, which has been shortened to reduce the overall height of the tool to 32 in.

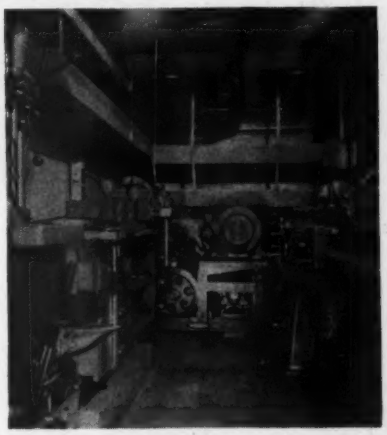
Power for the spike driver is provided by a single-cylinder, air-cooled engine with flywheel ignition, which burns gasoline mixed with a small quantity of oil. The fuel tank is said to have a capacity sufficient to permit several hours' operation without refilling. The engine cylinder contains the conventional engine piston and also a striking or hammer piston, the latter acting as a movable cylinder head which strikes the tool directly at each explosion. The hammer piston is returned to the firing position by low-pressure exhaust gas.



The Syntron Gasoline Hammer Spike Driver

## Mobile Machine Shop

THE Davey Compressor Company, Kent, Ohio, is manufacturing a completely-equipped truck-mounted machine shop that is adaptable for use in railway service wherever there is work to be done, such as the making of field repairs to trucks, motor cars and work equipment, that can be performed to advantage with the aid of a mobile shop. Known as the Davey Mobile Repair Shop, the assembly is suitable for mounting on any standard long wheel-base motor truck and is said to embody practically every item of equipment needed for mechanical repair and maintenance work. It is pointed out by the manufacturer that the use of a mobile repair shop of this type not only does away with the necessity of transporting machines to central shops for repairs, thereby eliminating costly shopping practices and producing substantial savings in time and labor, but also has the additional advantage of being in line with the current trend toward placing more emphasis on preventive maintenance, avoiding serious breakdowns in the field, with possible lost time to large gang organizations.



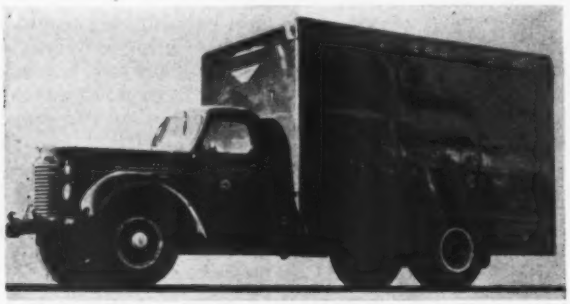
Interior of the Mobile Machine Shop

While it is possible to obtain almost any desired combination of equipment in this mobile repair shop, each assembly embodies, as the main power units, a 60-cu. ft. Davey compressor, a 300-amp. welding generator and a 50-kw. power generator. The provision of these power units is in line with surveys which are said to indicate that 90 per cent of all

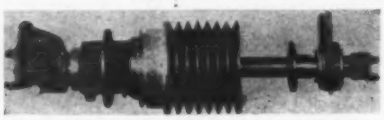
Side View of the Truck With the Side Panels Open

repair work is done at the ends of air hoses, electric lines or welding cords. The power tools and other auxiliary accessories to be provided will depend to a large extent on the particular type of work to be performed, and to this end the manufacturer invites prospective users to submit lists of equipment which they desire to include in the assemblies. The individual repair shops are then designed around the power units, i.e., the compressor, the welding generator and the power generator.

A typical set-up for the repair shop includes a 14½-in. lathe with complete accessories and tools; a 17-inch. drill press; a bench grinder with drill grinder attachment; an arbor press; arc-welding accessories and supplies; acetylene generator; oxygen bottles; acetylene cutting, welding and braising equipment with supplies; blacksmith's portable forge and hand tools; pneumatic hand tools such as grinders, riveting hammers and drills; machinists', electricians', carpenters' and pipe fitters' and plumbers' tools; drill taps and reamers; and such other tools and accessories as a chain hoist, hoisting winch, jacks, axe, pick, shovel and air hose. Other types of power equipment that may be worked into the assembly include wrenches, frog and switch point grinders, rail saws and drills, and spike drivers and pullers.



The Mobile Machine Shop With the Sides of the Truck Body Closed



Davey Split Propeller Power Take-Off

The key device in the assembly is what is known as the Davey Split Propeller Power Take-Off. Inserted in the drive shaft of the truck, this device is said to transmit all of the power of the truck engine to the driving of the air compressor, welding generator and the power generator. The power take-off eliminates the need for separate driving engines for each piece of equipment and thereby permits the placement on one truck of equipment which, if driven by individual engines, would require a considerably larger amount of space. The power take-off is simple in design and construction and it is said that it can be installed in a garage or service shop.

The truck body of the mobile repair shop is provided with the necessary tool boxes and storage bins. The lower thirds of the sides of the truck body may be lowered to a horizontal position, thereby providing a considerable amount of outside work-bench space. The upper two-thirds of the body sides can be raised to furnish protection against sun and rain for men working on the outside benches. The body is waterproof and is so designed that it can be locked securely to prevent tampering or theft. An outside power receptacle is provided to permit the use of local electric current when available. On the interior there are seven power receptacles and five ceiling lights.

Currently, a total of 100 of the assemblies is being produced for European shipment. These are to be used as substitutes for war-destroyed shop facilities in restoring machinery, buildings, utility services, railroads, etc. Three units have also been shipped to the Netherlands East Indies where they are to be used in repairing tin-mining equipment.

## Flintred Floor Coating

THE Flintkote Company, New York, has added a new product to its line of industrial coatings, known as Flintred, which is a synthetic plastic anti-slip coating that can be applied by trowel over floor surfaces of steel, concrete, aluminum, galvanized iron, hard tile and wood. Characterized as resistant to water, gasoline, oil, alcohol, ordinary fats and grease, the new material is recommended for periodical application to worn floor areas that become unsafe under foot when wet from water, oil or the like. On clean steel it serves also as a corrosion-resistant protective application.

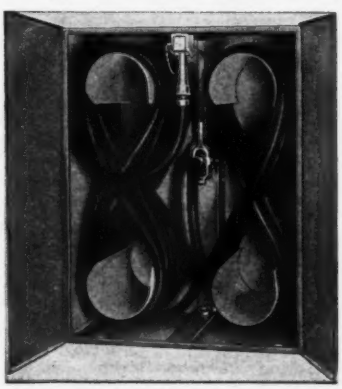
Flintred is available in red, green and slate blue, ready for application in coats of from 1/16 in. to ⅛ in. in thickness. The manufacturer has issued a data sheet giving recommended application methods to various surfaces around garages and machinery, on steps, ramps and platforms, in locker and shower rooms, and over steel surfaces.

## Fog Fire-Fighting Unit

BOWSER, INC., Ft. Wayne, Ind., has developed a fog fire-fighting unit for industrial and institutional use where water can do as much or more damage than a fire itself.

The unit, which consists of a cabinet, a 1-in. hose and a fog nozzle, is connected directly to a water line. An automatic valve-actuating fixture in the cabinet holds the fog nozzle ready for instant use, and it is said that the fog spray will appear at the nozzle at full capacity four seconds after it has been removed from the cabinet fixture. A feature of the device is that the spray is produced with the pressure provided by most city water systems.

Advantages claimed for the new unit are less water damage, a protective wall of fog shielding the operator from the heat of flames, and a dilution of gases behind the nozzle so that the operator may safely enter a gas or smoke-filled room. A standard solid-stream nozzle is provided for use where it is impossible to reach the flames with fog.



Bowser Model 1033 Fog Fire-Fighting Cabinet

The unit is furnished in two Models, 1030 and 1033, their difference being in the size of cabinet and length of hose. Model 1033, which is the larger, has 100 ft. of 1-in. hose. Both sizes are equipped with a swing joint mounting for the cabinet, allowing it to revolve in alinement with the direction of hose pull.

# Changes in Railway Personnel

## General

**J. F. Cooper,** assistant superintendent on the Canadian National, at Melville, Sask., and an engineer by experience, has been appointed superintendent at Port Arthur, Ont.

**A. Mosby Harris,** superintendent of the Logansport division of the Pennsylvania, with headquarters at Logansport, Ind., and an engineer by training and experience, has been promoted to superintendent of freight transportation of the Eastern region, with headquarters at Philadelphia, Pa.

**Bernard Allen,** assistant to the general manager, Western region, of the Canadian National, and an engineer by training and experience, has been appointed assistant general superintendent of the British Columbia district, with headquarters at Vancouver, B. C.

**W. H. Kyle,** superintendent of Montreal terminals and St. Jerome divisions of the Canadian National, at Montreal, Que., and an engineer by training and experience, has been appointed general superintendent of the Northern Ontario district, with headquarters at North Bay, Ont.

**Frederick N. Nye,** engineering economist in the office of the vice-president, improvements and developments, on the New York Central, at New York, and an engineer by training and experience, has been appointed assistant to general freight traffic manager, with headquarters at New York.

**John W. Barriger, III,** manager of the combined Diesel locomotive and railroad divisions of Fairbanks, Morse & Company, and an engineer by training and experience, has been elected president of the Chicago, Indianapolis & Louisville, with headquarters at Chicago. A photograph of Mr. Barriger and a sketch of his career appeared in the May issue.

**Major General Carl R. Gray, Jr.,** former director general of the Military Railway Service in the European Theater of Operations, and formerly executive vice-president of the Chicago, St. Paul, Minneapolis & Omaha, (a part of the Chicago & North Western system), has been elected vice-president in charge of public relations of the North Western, with headquarters at Chicago and St. Paul, Minn.

**Claude D. Merrill,** superintendent of the Philadelphia division of the Pennsylvania, at Harrisburg, Pa., and an engineer by training and experience, has been appointed assistant to the general manager, with headquarters at St. Louis, Mo., a newly-created position. **Morton S. Smith,** superintendent of freight transportation, at Chicago, and an engineer by training and experience, has been appointed superintendent of the Philadelphia division, succeeding Mr. Merrill. **Allen J. Greenough,** superintendent of the Wilkes-Barre division, at Sunbury, Pa., and an engineer by training and experience, succeeds Mr. Smith as superintendent of freight transportation, with headquarters at Chicago.

**John A. Schwab,** superintendent of the Pittsburgh division of the Pennsylvania, at Pittsburgh, Pa., and an engineer by training and experience, has been appointed general superintendent of the Southern division, with headquarters at Wilmington, Del.

**John Andrew Rogers,** whose appointment as general manager and chief engineer of the Central Vermont (part of the Canadian National System), with headquarters at St. Albans, Vt., was announced

John Andrew Rogers

in the April issue, was born at Cayuga, Ont., on July 19, 1883, and was graduated from the Royal Military College, Kingston, Ont. He entered railroading as a draftsman for the Illinois Central at Chicago in 1904, then went with the National Transcontinental in 1905 as an engineering assistant, which post he left in 1911 to become resident engineer for the Mackenzie Mann Company, at Edmonton, Alta. In 1916 Mr. Rogers was appointed division engineer of the Canadian Northern (C.N.R. affiliate) and the Canadian National, at Saskatoon, Sask., and in 1927, assistant superintendent of the C.N.R. there. He was advanced to superintendent in 1930, and served successively at Prince Albert, Sask., and Hornepayne, Allendale, and Ottawa, Ont. He was appointed assistant general manager, Central region, with headquarters at Toronto, Ont., in 1944, and maintained this post until his recent appointment became effective on March 8.

## Engineering

**H. F. Kimball,** division engineer on the Chicago, Burlington & Quincy, at Hannibal, Mo., has been appointed hydraulic engineer, with headquarters at Chicago, succeeding **C. C. Robnett,** whose promotion to assistant chief engineer, Western Lines, with headquarters at Lincoln, Neb., was reported in the May issue. **R. C. Russell,** instrumentman at Aurora, Ill., becomes division engineer at Hannibal, replacing Mr. Kimball.

**Hugh Everett, Jr.,** has been appointed assistant bridge engineer on the Southern, with headquarters at Washington, D. C.

**E. T. Bond, Sr.,** resident engineer on the St. Louis-San Francisco, with headquarters at Springfield, Mo., has retired.

**F. R. Naylor** has been appointed principal assistant engineer on the Texas & Pacific, with headquarters at Dallas, Tex.

**L. O. Puckett,** assistant engineer—buildings for the Eastern lines of the Southern, has been appointed assistant architect, Eastern lines, with headquarters as before at Charlotte, N. C.

**William H. Phelps,** assistant engineer in the chief engineer's office of the Southern Pacific, with headquarters at San Francisco, Cal., has retired after 43 years of service with the Southern Pacific.

**Arthur Anderson** has been appointed special assistant engineer on the New York Central, with headquarters at Chicago. **A. M. Westenhoff** has been appointed assistant engineer of structures at Chicago.

**W. B. Marshall,** division engineer on the Southern, at Somerset, Ky., has been transferred to Selma, Ala., replacing **L. B. Craig,** who has been transferred to Louisville, Ky., to succeed **C. E. Price,** who in turn replaces Mr. Marshall at Somerset.

**W. L. Hartzog,** whose appointment as assistant bridge engineer on the Atlantic Coast Line, with headquarters at Wilmington, N. C., was reported in the April issue, was born in Dorchester county, S. C., on December 21, 1903, and was graduated in

W. L. Hartzog

civil engineering from the University of South Carolina in 1926. He entered railway service in June, 1926, as a draftsman in the bridge department of the Coast Line, at Wilmington, and was advanced to junior engineer in 1928. Mr. Hartzog was promoted to senior assistant engineer in 1937 and to engineer of design on October 1, 1941. He was furloughed on August 1, 1942, to join the U. S. Army with 703rd Railway Grand Division (the Atlantic Coast Line sponsored unit of the Military Railway Service) as a captain. Mr. Hartzog was promoted to major in July, 1943, and served in North Africa, Italy and Eastern France,

until injured in December, 1944. He later returned to the European theater of operations, serving on railway bridge reconstruction and maintenance. He was separated from the army as a lieutenant-colonel, O.R.C., Corps of Engineers, on February 23.

**William W. Gwathmey, Jr.,** whose appointment as engineer of construction of the Baltimore & Ohio, with headquarters at Baltimore, Md., was announced in the April issue, was born on January 18, 1889, and

W. W. Gwathmey, Jr.

entered railroad service in 1911 as axeman on the B. & O. He was advanced successively to chainman, rodman, transitman, assistant resident engineer, and then field engineer, before he was furloughed for military duty in 1917. He returned to the B. & O. in 1919 as transitman, was promoted to field engineer in 1923, then assistant engineer at Baltimore in 1924, and resident engineer there in 1935, then again assistant engineer in 1936. Mr. Gwathmey advanced to district engineer in 1941, which position he maintained until his recent promotion, effective March 7.

**C. E. Ekberg** has been appointed bridge engineer on the Northern Pacific, with headquarters at St. Paul, Minn., succeeding **R. R. Brockway**, who has retired.

**W. W. Greiner,** engineer of maintenance of way of the Gulf, Mobile & Ohio, at Mobile, Ala., has been appointed chief engineer, with the same headquarters, succeeding **L. P. O. Exley,** who has retired after 46 years of service.

**R. H. Stenhouse,** valuation statistician on the Canadian Pacific at Montreal, Que., has been appointed engineer of the Dominion Atlantic (leased by the Canadian Pacific), with headquarters at Kentville, N.S., succeeding **J. J. Richardson,** who has been transferred to Montreal as engineer in charge of special construction work.

**William H. Kendall,** whose promotion to assistant division engineer on the Pennsylvania, with headquarters at Altoona, Pa., was reported in the March issue, was born at Somerville, Mass., on March 24, 1910, and attended Dartmouth college. He entered railway service on June 16, 1933, as an assistant on the engineering corps at Erie, Pa., and the following year was promoted to assistant supervisor of track at Wellsville, Ohio, later being transferred to Cresson, Pa. Mr. Kendall was advanced to supervisor of track at Union City, Ind., in July, 1939, was transferred to Philadelphia, Pa., in February, 1941, and to Wilmington, Del., in January, 1942, where he was located at the time of his recent promotion.

**James Cherrington,** whose promotion to division engineer on the Canadian Pacific, with headquarters at Penticton, B. C., was reported in the March issue, was born at Spokane, Wash., on June 18, 1910, and was graduated from the University of Alberta in 1935 with the B. S. degree in civil engineering. From 1935 to 1941 he was employed as resident engineer for the provincial department of public works, at Nelson, B. C. He entered the service of the Canadian Pacific on June 25, 1941, as a transitman at Penticton, and served in that capacity until May, 1945, when he became relieving roadmaster on various divisions in British Columbia, the position he held at the time of his recent promotion.

**Joseph W. Jones,** whose appointment as regional engineer of the Baltimore & Ohio, with headquarters at Baltimore, Md., was announced in the April issue, was born on November 24, 1896, at Baltimore, and entered railroading in 1917 as

Joseph W. Jones

a chainman on the B. & O. He served subsequently as rodman, inspector, engineering accountant and field engineer, and was advanced to resident engineer in 1935, then appointed assistant engineer in 1937, and again promoted in 1942, becoming senior assistant engineer, which post he held until his appointment as regional engineer became effective on March 7.

**R. E. Copper,** whose promotion to chief engineer of the Peoria & Pekin Union, with headquarters at Peoria, Ill., was reported in the April issue, was born at Mason City, Ill., on August 21, 1894, and received his higher education at the University of Illinois. He started railroad service in August, 1916, with the Great Northern, and in July, 1930, he entered the service of the Peoria & Pekin Union at Peoria, Ill., and became assistant chief engineer in 1944. In May, 1945, he was appointed acting chief engineer, the position he held at the time of his recent promotion.

**W. H. Moore,** whose promotion to assistant division engineer on the Southern, with headquarters at Atlanta, Ga., was reported in the April issue, was born on May 8, 1916, at Hazard, Ky. He first entered the service of the Southern in February, 1941, as a student apprentice at Alexandria, Va. He was promoted to supervisor of work equipment in September, 1941, which position he held until his recent appointment, effective March 1.

**G. H. Echols,** whose promotion to division engineer of the Atlanta division of the Southern, with headquarters at Atlanta, Ga., was reported in the April issue, was born at Milledgeville, Ga., on June 17, 1901, and entered the service of the Southern in May, 1924, as a junior engineer at Macon, Ga. He was appointed assistant track supervisor at Rome, Ga., in July, 1926, and was advanced to track supervisor at Jacksonville, Fla., in February, 1930. He was promoted to assistant roadmaster at Atlanta in March, 1935, and advanced to assistant division engineer of the Atlanta division on January 16, 1946.

Effective May 1, **E. W. Scott,** whose appointment as track supervisor on the Erie was reported in the May issue, was re-appointed assistant division engineer of the Buffalo and Rochester divisions, with headquarters at Buffalo, N.Y., succeeding **Arthur Price,** who has been promoted to division engineer at Huntington, Ind., replacing **Wesley F. Petteys,** who has been transferred to Youngstown, Ohio, relieving **P. F. Nichols,** assigned to other duties.

**H. A. Aalberg,** whose promotion to assistant chief engineer of the Burlington System, with headquarters at Chicago, was reported in the May issue, was born at Minneapolis, Minn., on September 6, 1887, and received his higher education at Highland Park College. He entered railroad service on May 16, 1910, as a field draftsman on the Burlington, and served as draftsman in the assistant chief engineer's office and as instrumentman until June, 1916, when he was appointed divi-

H. A. Aalberg

sion engineer on the Lincoln division, with headquarters at Lincoln. Mr. Aalberg served as locating engineer from May to November, 1912, and then returned to Lincoln, where he served as division engineer until February, 1923, when he was transferred to Denver, Colo., in the same capacity. In February, 1937, he was advanced to assistant chief engineer,

Western Lines, at Lincoln, the position he held at the time of his recent promotion.

**William N. Young,** whose promotion to chief engineer of the Lakefront Dock & Railroad Terminal (a joint subsidiary of the Baltimore & Ohio and the New York Central), with headquarters at Toledo, Ohio, was reported in the April issue, was born at Baltimore, Md., on August 3, 1898, and received his higher education at Balti-

William N. Young

more Polytechnical Institute and at John Hopkins University. He entered railroad service in September, 1916, as a chainman on the Baltimore & Ohio, became rodman in October, 1916, levelman in May, 1917, and transitman in October, 1917. In April, 1926. Mr. Young was appointed field engineer at Philadelphia, Pa., and was promoted to assistant engineer, with the same headquarters, in March, 1929. In October, 1942, he was advanced to assistant to the chief engineer, at Baltimore, the position he held until the time of his recent appointment.

**Gordon L. P. Plow,** whose promotion to division engineer of the Ottawa division of the Canadian National, with headquarters at Ottawa, Ont., was reported in the March issue, was born at St. Albans, Vt., on June 27, 1902, and was graduated in civil engineering from McGill University in 1924. He entered railway service in June, 1924, as a chainman on the Chicago, Rock Island & Pacfic and served in that capacity and as a rodman on surveys and construction work in Oklahoma, Missouri and Kansas. In October, 1925, he was promoted to assistant engineer on yard and terminal traffic studies at Chicago, and from March, 1926, to July, 1927, he served as instrumentman and resident engineer on construction at Amarillo, Tex. Mr. Plow then served as an instrumentman on various divisions in Iowa, Illinois and Missouri until May, 1929, when he went with the Canadian National as an instrumentman at Quebec, Que., later being transferred to Levis, Que. From November, 1929, to June, 1930, he worked as a field engineer for Purdy & Henderson Co., Ltd., contractors at Montreal, Que., and on the latter date went with the Canadian Pacific as a resident engineer on bridge construction in Maine, later being appointed a draftsman in the car department at Montreal. In February, 1931, he went with Canadian Airways, Ltd., as an engineer-mapping, and from February, 1932 to January, 1936, he worked as engineer for the city of Westmount, Que. Mr. Plow returned to the Canadian National in April, 1936, as an instrumentman on the Laurentian division, later being transferred to the Levis division. From May, 1941, to January, 1946, he served in the Royal Canadian Engineers, advancing from second lieutenant to major and serving in Canada, England, Belgium, Holland and Germany. Mr. Plow returned to the Canadian National in January, 1946, as assistant division engineer of the Laurentian division, with headquarters at Quebec, which position he held until his recent promotion.

**Hector K. Morrison,** whose appointment as district engineer of the Canadian National at Montreal, Que., was announced in the March issue, was born at Dartmount, N.S., in 1887. He began his railway career as a chainman for the Halifax and Southwestern (now C. N. R.) in 1901, later serving the Quebec & Lake St. John (now C. N. R.). In 1905 he joined the Canadian Northern (now C. N. R.), serving successively as topographer, leveller, transitman, engineer, and resident engi-

Hector K. Morrison

neer at Pembroke, Ont. After overseas service with the C. E. F. during World War I, Mr. Morrison returned to the Canadian Northern as division engineer at Hornepayne, Ont., transferring to Montreal in 1920, and, following the formation of the Canadian National, served as assistant engineer at various points in Quebec and Ontario. He was promoted to district engineer for the survey and construction of the Rouyn-Senneterre branch line in 1936, and then resident engineer of the Montreal terminal development in 1939. Advanced to terminal engineer at Montreal in 1942, he maintained this postion until his promotion became effective on January 17.

**F. C. Knight,** whose promotion to valuation engineer of the Canadian National, with headquarters at Toronto, Ont., was reported in the March issue, was born in Prince Edward Island and was graduated in civil engineering from McGill university. From 1910 to 1913 he served in the construction department of the Canadian Pacific, and then left that road to engage in other engineering work. He returned to railroad service in 1916 as a draftsman in the valuation department of the Grand Trunk (now part of the Canadian National) at Montreal, Que., and in 1923 was transferred to Toronto. Since that time he has served in various capacities, including engineer accountant, which position he held at the time of his recent promotion.

**J. H. Knowles,** whose retirement as division engineer on the Southern Pacific, with headquarters at San Antonio, Tex., was reported in the April issue, was born at Chicago on December 15, 1875, and received his higher education at the Universtiy of Wisconsin. He entered railroad service in December, 1900, as a draftsman in the office of the chief engineer of the Oregon Short Line (now part of the Union Pacific), at Salt Lake City, Utah. In October, 1903, he became assistant engineer on the Los Angeles & Salt Lake (now part of the Union Pacific), at Salt Lake City. In September, 1910, he was appointed division engineer on the Western Pacific, at Elko, Nev., and served there until December, 1911, when he became bridge engineer at San Francisco, Cal. Mr. Knowles was appointed chief engineer on the Western Pacific in November, 1918, and served in that capacity until May, 1920, when he entered the service of the Southern Pacific as division engineer, holding this position until his retirement.

**Robert M. Nall,** whose promotion to valuation engineer on the St. Louis Southwestern, at St. Louis, Mo., was reported in the April issue, was born at San Antonio, Tex., on August 26, 1912, and received his higher education at the University of Texas. He entered railroad service on October 4, 1936, as a rodman on the St. Louis Southwestern, at Pine Bluff, Ark. From November, 1937, to October, 1943, he served as junior transit-

Robert M. Nall

man, with the same headquarters, and on the latter date he was promoted to transitman. In March, 1945, he was advanced to senior transitman, the position he held at the time of his recent promotion.

## Track

**Stuart Shumate,** recently released from military service and formerly supervisor of track on the Pennsylvania, has returned to that road as supervisor of track at Columbus, Ohio, replacing **J. L. Tedesco,** who has been transferred to Columbus, Ind., where he succeeds **Lloyd Wallace,**

who becomes acting supervisor of track at Anderson, Ind. **N. D. Patterson,** assistant supervisor of track at Huntingdon, Pa., has been appointed supervisor of track on the Toledo division at Toledo, Ohio, in place of **C. R. McNary,** who has returned to his former position as general foreman on the St. Louis division. **J. E. Dixon,** supervisor of track at Crestline, Ohio, has been transferred to Logansport, Ind., succeeding **L. D. Shoda,** who has returned to his former position as track foreman. **G. A. Royce,** recently released from military service, has been appointed supervisor of track at Crestline, succeeding Mr. Dixon.

**J. H. Gravel** has been appointed roadmaster on the Canadian National, at Parent, Que., succeeding **A. Dewar,** who has retired.

**D. C. Hastings** has been appointed supervisor of track on the Pennsylvania, with headquarters at Buffalo, N. Y.

**F. T. Dixon,** roadmaster on the Canadian National, at Moose Jaw, Sask., has retired.

**Malcolm Condon,** whose appointment as general foreman on the Erie, at Croxton, N. J., was reported in the May issue, has been re-appointed track supervisor at Campbell Hall, N.Y.

**C. B. Young,** roadmaster on the Chicago, Burlington & Quincy, at Sterling, Colo., has been transferred to Greybull, Wyo., succeeding **C. R. Rook,** who has been relieved on account of ill health.

**R. E. Barnett,** inspector in the office of the manager of roadway maintenance of the Norfolk & Western, has been promoted to assistant roadmaster at Williamson, W. Va.

**G. W. Dabbs,** formerly an assistant on the engineer corps of the Pennsylvania, who has recently returned from military service, has been appointed assistant supervisor of track at Trenton, N.J., succeeding **D. C. Avoletta,** who returned to his former position as general foreman on the New York division.

**T. C. Harvey,** roadmaster on the Missouri Pacific, at Jefferson City, Mo., has been transferred to the Wichita division, with headquarters at Yates Center, Kan., succeeding **C. C. Van Stratten,** who has been transferred to Jefferson City to replace Mr. Harvey.

**G. W. Shafer,** supervisor of track on the Illinois Central, at Council Bluffs, Iowa, has been transferred to Rockford, Ill., succeeding **J. R. Wartchow,** assigned to other duties. **C. J. Harrington,** assistant supervisor at Waterloo, Iowa, succeeds Mr. Shafer as supervisor of track at Council Bluffs.

**M. H. Bootjer** has returned to his position as roadmaster on the Chicago, Rock Island & Pacific, at Rock Island, Ill., replacing **B. S. Buskovick,** who has been transferred to Atlantic, Iowa, where he replaces **Noble Hurt,** who in turn has been transferred to St. Joseph, Mo., temporarily relieving **D. W. Bickett.**

**C. E. Moore,** whose promotion to roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Othello, Wash., was reported in the March issue, was born at Lewiston, Idaho, and entered the service of the Milwaukee on December 20, 1930. On April 2, 1935, he was promoted to section foreman, and two years later he became assistant foreman of a tie and ballast gang. Mr. Moore was promoted to general foreman on July 6, 1938, with headquarters at Pocono, Idaho, and served in that capacity until March 1, 1942, when he was advanced to assistant roadmaster at St. Maries, Idaho, the position he held at the time of his recent promotion.

**James R. Kanan,** whose promotion to assistant engineer of track on the Fort Worth & Denver City and the Wichita Valley (parts of the Burlington Lines), with headquarters at Fort Worth, Tex., was reported in the April issue, was born at Brookfield, Mo., on July 5, 1896. He entered railroad service on May 26, 1911, as a water boy in extra gang, with the

James R. Kanan

Chicago, Burlington & Quincy, and served as assistant foreman from June 1, 1914, to June 30, 1916, when he became section foreman. After his release from the armed forces, he returned to the Burlington on May 25, 1919, as section foreman on the Brookfield division. On May 1, 1921, he was appointed assistant roadmaster on the same division, and on November 1, 1922, he became roadmaster at the Kansas City terminal, in which capacity he served later at Albany, Mo., Hannibal and Old Monroe. In 1936 Mr. Kanan was transferred to Galesburg, Ill., where he remained until the time of his recent promotion.

**Charles E. Fox,** whose promotion to roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters, at Terre Haute, Ind., was reported in the April issue, was born at Kurtz, Ind., on July 28, 1902, and entered railroad service on January 10, 1917, as a section laborer on the Chicago, Terre Haute & Southeastern (part of the Chicago, Milwaukee, St. Paul & Pacific). Until 1926 he served part of the time as assistant foreman, and was promoted to section foreman at Blanford, Ind., on April 19, 1926, and to yard foreman at West Clinton, Ind., on April 15, 1927. In 1932 Mr. Fox was transferred to Jasonville, Ind., as yard foreman. Until October, 1936, he worked as extra-gang foreman through the summer months, and was then transferred to the Hulman Street Yards at Terre Haute. He held that position, working seasonally as general foreman on extra gangs, until the time of his recent promotion.

**Edward F. Burke,** assistant supervisor of track of subdivision No. 1 of the Central division of the Central Railroad of New Jersey, at Jersey City, N.J., has been promoted to supervisor of track of subdivision No. 2, Central division, with headquarters at Somerville, N.J., succeeding **Calvin J. Langenbach,** who has been transferred to the Southern division of the Jersey Central and the New York & Long Branch (joint trackage), with headquarters at Long Branch, N.J. Mr. Langenbach relieves **E. F. Shelley,** who has been transferred to subdivision No. 1, Central division, of the Jersey Central, with headquarters at Jersey City, replacing **Tom F. Langan,** who resigned on May 1 to go with the Frank Speno Railroad Ballast Cleaning Company as reported elsewhere in these columns. **John J. Kozzi,** general foreman at Somerville, N.J., has been promoted to assistant supervisor of track of subdivision No. 1, Central division, at Jersey City, relieving Mr. Burke, and **Thomas J. Reagan** has been appointed assistant supervisor of track at Somerville, N.J., succeeding to the duties of Mr. Kozzi.

**Martin Boese,** whose promotion to roadmaster on the Canadian National, with headquarters at Trenton, Ont., was reported in the March issue, was born at Haley's Station, Ont., on May 28, 1898, and entered railway service on December 1, 1917, as a sectionman on the Grand Trunk (now part of the Canadian National) at Arnprior, Ont. On May 10, 1923, he was promoted to section foreman at Opeongo, Ont., later being transferred to Elgin, Ont., and subsequently serving also as extra gang foreman during summers of 1930 to 1936. Mr. Boese was located at Elgin at the time of his recent promotion, effective February 1.

**Earl E. Long,** whose promotion to roadmaster on the Chicago, Milwaukee, St. Paul & Pacific, with headquarters at Austin, Minn., was reported in the April issue, entered railroad service on June 1, 1920, as a section laborer on the Milwaukee, at Kimball, S. D. In 1924 he became relief foreman, and was promoted to section foreman in 1927. In 1937 he was appointed extra-gang foreman and served in that capacity until 1943, when he was advanced to general foreman on the La Crosse & River division. Mr. Long was transferred to Lines West in June, 1944, on rail and ballast work, and returned to Alexandria, S. D., in February, 1946, where he remained until his recent promotion.

**C. E. Weller,** whose promotion to supervisor of track on the Illinois Central, with headquarters at DuQuoin, Ill., was reported in the April issue, was born at Mannington, W. Va., on December 24, 1915, and received his higher education at Pennsylvania State College. He entered railroad service in June, 1937, on the Pennsylvania. In April, 1938, he entered private industry and was employed on construction work until January, 1939,

*(Continued on page 656)*

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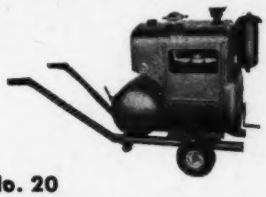
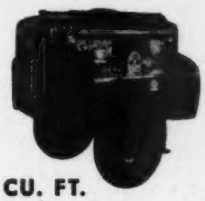
## AIR COMPRESSORS
## SIZES FROM 20 TO 420 CU. FT. ACTUAL AIR



**No. 20**
**ON SHOP TRUCK**

The No. 20 compressor is a complete self-contained unit available in various types of mountings and with an actual air delivery of 20 cu. ft. per minute.



**60 CU. FT.**
**DE LUXE WITH TOOL BOXES**

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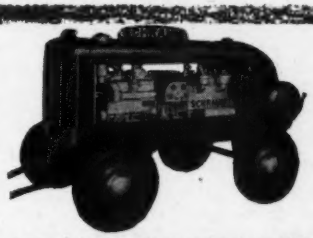
**105 CU. FT.**
**WITH SWIVEL TYPE WHEEL**

This trailer type mounting is provided with a universal coupling or towing ring for connection to car or truck for hauling at maximum towing speed.



**105 CU. FT. WITH STREAMLINE FUEL TANK**

A pneumatic tired mounting used generally for rapid transit over town and country highways. Lighter weight and better balance provide easier handling.

**210 CU. FT.**
**STANDARD SKID MOUNTED**

This unit is easily loaded on to a motor truck body for temporary use or for transportation, and can also be used for temporary or permanent stationary installation without addition of foundation.

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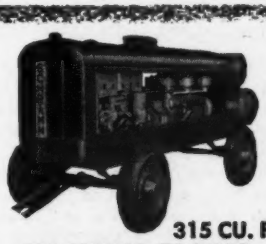
Any of the Standard self-aligned Schramm compressor units complete with streamline tool box and built-in fenders are available for mounting on truck chassis.



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The Spring Trailer, with pneumatic tires and semi-elliptical springs front and rear, is equipped with an automotive type steering assembly to provide perfect balance on any and all turns.

**STEEL WHEEL MOUNTING**

All size Schramm compressors are available in this type mounting with heavy, wide steel rims for easy portability in tough terrain.

**420 CU. FT.**
**DIESEL ENGINE DRIVEN**

Schramm Diesel Engine Driven units are available in sizes ranging from 105 to 420 cu. ft. of free air.

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when he entered the service of the Illinois Central as a chainman at Champaign, Ill. He became rodman at Waterloo, Iowa, in March, 1940, and in May, 1941, he was promoted to assistant supervisor, in which capacity he served consecutively on the Iowa, Springfield, Illinois, and Ohio divisions. From October, 1942, to November, 1945, Mr. Weller served with the armed forces, and returned to the Illinois Central in November, 1945, as assistant supervisor on the St. Louis division, the position he held at the time of his recent promotion.

### Special

**James W. Cummings** has been appointed supervisor of work equipment on the Delaware & Hudson, with headquarters at Albany, N.Y., succeeding **Joseph J. Pariseau,** deceased.

### Bridge and Building

**J. J. Ridgeway** has been appointed acting supervisor of structures on the Bessemer & Lake Erie, with headquarters at Greenville, Pa., replacing **R. Ridge,** who has been assigned to other duties.

**H. C. Halliday,** bridge and building foreman on the Canadian National, at Prince Rupert, B. C., has been promoted to bridge and building master, with the same headquarters, succeeding **H. E. Alton,** who has retired.

**W. H. Miller,** whose promotion to bridge and building master of the Toronto terminals of the Canadian National, at Toronto, Ont., was reported in the March issue, was born at Trenton, Ont., and entered C.N.R. service as a carpenter at Trenton, later being transferred successively to the Ottawa subdivision and the Belleville division. In 1940 he was promoted to foreman, and in 1944 to general bridge and building foreman of the Belleville division, which position he held at the time of his recent promotion.

**S. O. Sathre,** whose promotion to superintendent of bridges and buildings on the Chicago & North Western, with headquarters at Norfolk, Neb., was reported in the May issue, was born at Eagle Grove, Iowa, on January 17, 1906, and entered railroad service on May 21, 1923, as a carpenter helper on the North Western, at Eagle Grove. He became carpenter on the Sioux City division in April, 1926, and carpenter leader on the same division in June, 1928. In November, 1933, he was appointed pile driver engineer, and on June 28, 1935, he became bridge and building foreman. Mr. Sathre was advanced to assistant superintendent of bridges and buildings on January 1, 1941, with headquarters at West Chicago, Ill.

### Obituary

**G. A. Haggander,** assistant chief engineer of the Chicago, Burlington & Quincy, with headquarters at Chicago, whose death on April 14 was reported in the May issue, was born at Sioux City, Iowa, on January 30, 1885, and graduated from Armour Institute of Technology, Chicago. He entered railway service in 1905 as a draftsman in the office of the bridge engineer of the Burlington, later serving as a concrete inspector and designer. On June 10, 1910, he was promoted to office engineer, and two years later he was advanced to assistant bridge engineer of the lines East of the Missouri river, with

G. A. Haggander

headquarters at Chicago. Mr. Haggander was promoted to bridge engineer of the Burlington in 1916, with headquarters as before at Chicago, and in December, 1938, his jurisdiction was extended to include the Colorado & Southern and Ft. Worth & Denver City. In May, 1939, he was promoted to assistant chief engineer, and in 1943 his jurisdiction was enlarged to include the whole Burlington system. He was a member of the board of directors of the American Railway Engineering Association.

**W. H. Haid,** assistant supervisor of track on the New York Central, died recently at his home in Elkhart, Ind.

**Hans Schumacher,** roadmaster on the Chicago, St. Paul, Minneapolis & Omaha, at Mankato, Minn., died recently in a hospital in that city.

**Duncan Wanless,** who retired on July 1, 1924, as bridge and building master of the Trenton division of the Canadian Pacific, died recently at Toronto, Ont.

**J. E. Brozeau,** retired roadmaster of the Canadian National at Richmond, Que., died recently.

**Oscar E. Selby,** who retired in 1938 as principal assistant engineer on the Cleveland, Cincinnati, Chicago & St. Louis, died recently at Cincinnati, Ohio.

**E. G. Lane,** who retired in 1945 as assistant engineer in the division engineer's office on the New York Central, at Columbus, Ohio, died recently in that city.

**L. W. Baldwin,** president and chief executive officer of the Missouri Pacific Lines, and an engineer by training and experience, died at St. Louis, Mo., on May 14, at the age of 71.

**John Foley,** whose retirement as forester of the Pennsylvania, with headquarters at Philadelphia, Pa., was reported in the May issue, died at Wayne, Pa., on May 17.

# Association News

## Railroad Conventions

As the result of unsettled conditions in the railroad industry, which culminated in government seizure of the railroads on May 17, and the strike of railway trainmen and engineers on May 23, the conventions of several railroad organizations or related groups have been cancelled or postponed. Among these are the Mechanical and Purchases and Stores divisions of the Association of American Railroads, whose conventions were scheduled for June 20 and 21; the Superintendents' Association, which was to have met on June 6-8; and the Railway Tie Association, whose convention was scheduled for May 28-29. Plans are proceeding for the concurrent conventions of the Roadmasters' Association and the American Railway Bridge & Building Association in Chicago, September 17-19, as noted in following items.

## Railway Tie Association

Owing to the strike of railway trainmen and engineers, the Twenty-Eighth annual meeting of the association, which was to have been held in Cincinnati, Ohio, May 28-29, was, on May 25, postponed indefinitely. At the time of postponement, more than 150 members and others interested in the work of the association, held hotel reservations in anticipation of the meeting.

## Maintenance of Way Club of Chicago

President E. C. Vandenburgh, chief engineer, Chicago & North Western, will call a meeting of the Executive committee of the club early in June to consider appointments to the standing committees for the year ahead and to plan for the fall season, beginning in October. As in past years, no dinner meetings will be held during the summer months.

## Roadmasters' Association

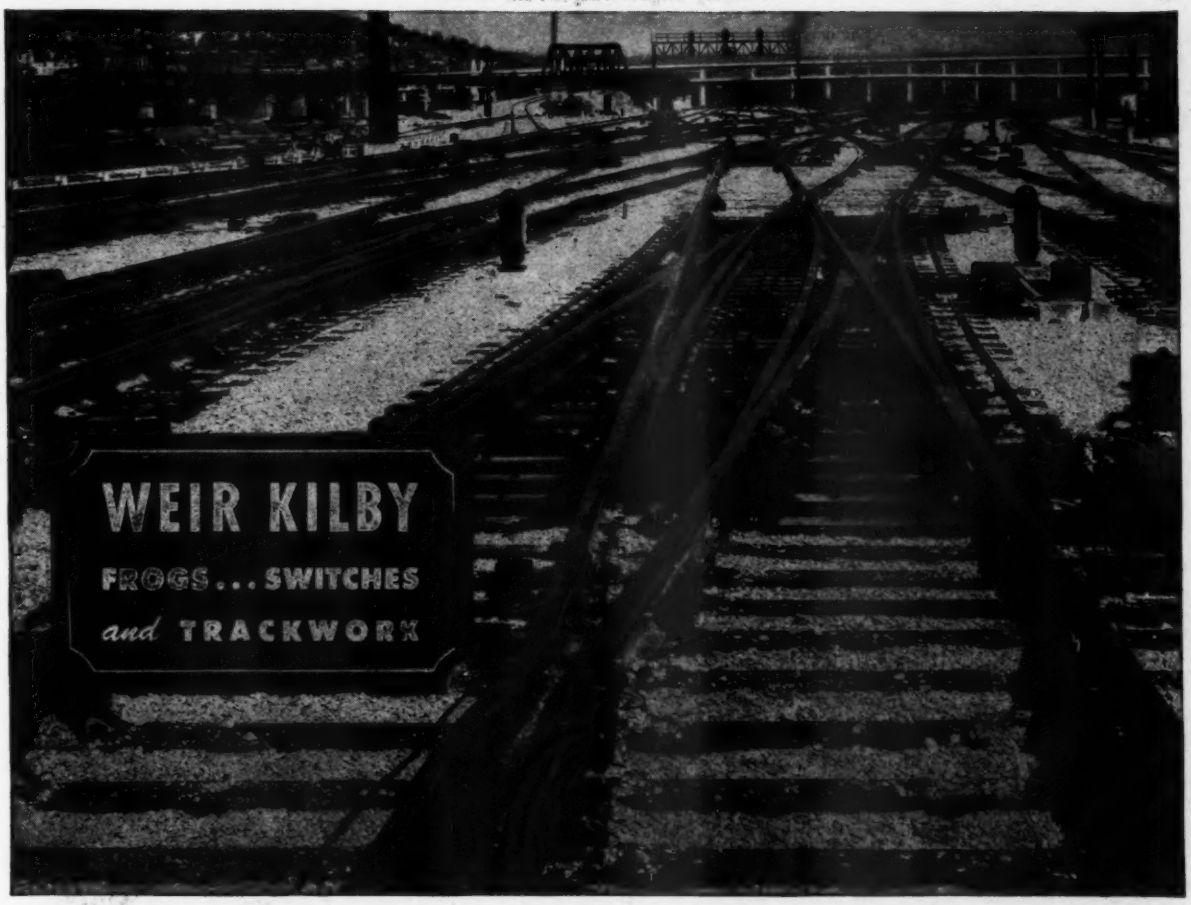
President H. E. Kirby, assistant engineer, Chesapeake & Ohio, Richmond, Va., has called a meeting of the Executive committee of the association, in Chicago, July 15, to review, with the chairmen of the various technical committees, preliminary drafts of reports to be presented at the annual convention of the association, in Chicago, September 17-19. It is also planned at that time to set op a tentative propram for the convention.

## Bridge and Building Association

All the technical committees of the association are far advanced with the preparation of their reports, and President Neal Howard, editor, *Railway Engineering and Maintenance,* has called a meeting of the Executive committee, in Chicago, July 8, to review, with committee chairmen, the preliminary drafts of these reports.

The drive for new members and associate

*(Continued on page 658)*




**BUILT TO A.R.E.A. or RAILROAD SPECIFICATIONS . . . FROGS, SWITCHES, GUARD RAILS and CLAMPS, CROSSINGS . . . MANGANESE and HEAT TREATED RAIL WORK.**

The products of Weir Kilby Corporation are well and favorably known by the many railroads and large industrial plants of the country.

Accumulated experience, thru the many years of gradually expanding operations, has been an important factor in the quality of our products and the cooperative relations with our numerous customers.

Having factories located at both Cincinnati and Birmingham, each carrying substantial inventories of raw materials, we are well situated to meet your varied needs.

*Weir Kilby's combination of competent engineering, modern machines and skilled operators, all work together for our customers' advantage.*

**CATALOG "H"**

**Comprises 154 pages of helpful data, replete with photos, drawings and specifications, covers every track work need. A request on your letterhead will bring your copy, promptly.**

*Standard and Special Track Work for Steam Railroads Since 1882*

# WEIR KILBY CORPORATION

CINCINNATI 12, OHIO — BIRMINGHAM 7, ALA.

Successors to

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members of the association continues under the direction of W. F. Martens, gen. supvr. bridges, buildings and water service, Atchison, Topeka & Santa Fe, San Bernardino, Cal., and active plans are under way for the convention of the association, in Chicago, September 17-19, concurrent with the annual convention of the Roadmasters' Association, and a joint exhibit of the Track Supply Association and the Bridge and Building Supply Men's Association.

### Track Supply Association; B. & B. Supply Men's Association

As the result of announcements of resumed activities and campaigns for new members, both the Track Supply Association and the Bridge and Building Supply Men's Association are recouping their memberships following their relative inactivities during the war years and are planning an outstanding exhibit of materials and equipment at the Hotel Stevens, Chicago, September 16-19, in conjunction with the annual conventions of the Roadmasters' Association and the American Railway Bridge and Building Association. Already 67 companies have contracted for exhibit space, occupying 113 booths, with new applications coming in daily, which insure the largest exhibit in the history of either of these associations. Inquiries concerning membership in the Track Supply Association should be addressed to Lewis Thomas, Secretary, 59 E. Van Buren St., Chicago, and concerning membership in the B. & B. Supply Men's Association, to E. C. Gunther, Secretary, 122 S. Michigan Ave., Chicago. Inquiries concerning the exhibit should be made direct to Mr. Thomas, who is acting as Director of Exhibits.

### American Railway Engineering Association

Curtailment of railway service during May because of the coal strike and other factors caused serious interference with the holding of committee meetings during that month. Three committees that had scheduled meetings found it necessary to cancel their plans in this regard, these including the Committees on Highways, Records and Accounts, and Track. Several committees that had scheduled meetings early in the month were able to proceed with their plans. These included the Committee on Maintenance of Way Work Equipment, which met at Knoxville, Tenn., on May 8, and the Committee on Iron and Steel Structures, which met at Urbana, Ill., on May 1 and 2. A number of committees have announced plans for holding meetings in June, but whether they will be able to carry out such plans will depend on developments.

### Metropolitan Maintenance of Way Club

In the election of officers at the annual meeting held at the Hotel Sheraton on April 25, Philip O. Reilly, track supervisor, New York, New Haven & Hartford, was advanced from first vice-president to president; A. J. Flanagen, assistant engineer, New York Central, was advanced from second vice-president to first vice-president; C. H. Stevenson, assistant engineer, Pennsylvania, was elected second vice-president; and J. S. Vreeland, eastern editor, *Railway Engineering and Maintenance*, was re-elected secretary-treasurer. Members elected to the executive committee were Walter W. Crowley (retiring president), general inspector of maintenance, Lehigh Valley; T. E. MacMannis, engineer maintenance of way, Central Railroad of New Jersey; C. K. Scott, engineer maintenance of way, Eastern district, Erie; and J. N. Thorp, J. N. Thorp Company, New York.

The annual outing of the club will be held at the Out of Bounds Country Club, Suffern, N.Y., on Thursday, June 20. The activities of the day will consist principally of sports, including golf, soft ball, horse shoes, and quoits, with prizes being awarded in all events. A buffet luncheon will be served at noon.

## Supply Trade News

### Personal

**Walter G. Mitchell,** chief production engineer of the **Independent Pneumatic Tool Company,** Chicago, has been promoted to director of engineering and research.

**Milton H. Smith** has been appointed supervisor of fork-type lift truck engineering for the **Hyster Company.** Mr. Smith will have headquarters in the Portland, Ore. home office.

**E. C. Johnson, Jr.,** and **D. M. Graves,** recently released from the Navy, have become associated with the **Rail Joint Company.** Mr. Johnson will be located in San Francisco, Cal., and Mr. Graves in New York.

**The Rust-Oleum Corporation,** Evanston, Ill., has announced the appointment of two new agents: **E. W. Kush,** 769 St. Paul St., Denver, Colo.; **R. B. Parrish,** 1201 Fourth St., Jackson, Mich.

**Charles Rager** has been appointed district manager at St. Louis, Mo., for **Fairmont Railway Motors, Inc.,** Fairmont, Minn., with headquarters at 1218 Olive Street, St. Louis 3, where he replaces **W. G. Day,** who has resigned.

**Benjamin O'Shea,** associated with the **Union Carbide & Carbon Corp.** since its formation in 1917, has retired as chairman of the board of directors. He will continue as a director and a member of the executive committee. The office of chairman of the board has been abolished with Mr. O'Shea's retirement.

Effective May 1, **Tom F. Langan** was appointed general foreman in charge of ballast cleaning equipment of the **Frank Speno Railroad Ballast Cleaning Company,** Ithaca, N.Y., with headquarters at Ithaca. Mr. Langan was formerly track supervisor on the Central Railroad of New Jersey at Jersey City, N.J.

**H. L. Beohner** and **A. D. Way** have been appointed technical manager and chief mechanical engineer, respectively, of **The Permutit Company,** New York. Mr. Beohner will be responsible for the company's technical policy on the application, guarantee, and performance of its products. Mr. Way will administer the engineering department and supervise the mechanical design and layout of equipment.

**Carl O. Wold,** a vice-president of the **Caterpillar Tractor Company,** Peoria, Ill., and executive head of the Russell Grader Manufacturing Company prior to its acquisition by the Caterpillar organization in 1928, has retired.

**Russell R. Morgan** has been appointed head of the newly formed manufacturing operations division of the **Le Roi Company,** Milwaukee, Wis. This new division, to be known as "The Cleveland Division," will produce a complete line of rock drills and related pneumatic equipment to serve the construction, mining, and transportation industries.

**Brigadier General W. C. Kabrich** has joined the **Flintkote Company** as assistant director of research and is stationed at the East Rutherford (N.J.) laboratory of the company. Recently retired from the United States Army after nearly thirty years of service, General Kabrich has long been actively associated with chemical research, development and engineering.

**F. B. Hornibrook,** whose appointment as assistant director of research of the **Master Builders Company,** Cleveland, Ohio, was reported in the April issue, has been on the staff of the National Bureau of Standards since 1930 and served as assistant to the section chief of the cement and concreting materials section for the

F. B. Hornibrook

past five years. He also has served such government agencies as the repairs and utilities branch of the U. S. Engineers and the Maritime Commission on consulting assignments. He is a member of American Concrete Institute, serving as chairman of the Committee on Admixtures for Concrete; a member of the American Society for Testing Materials; and an associate member of the Highway Research Board, serving as chairman of its Committee on Dynamic Tests of Concrete.

**S. D. Means,** industrial sales manager for **R. G. LeTourneau, Inc.,** Peoria, Ill., has been appointed to the newly-created position of domestic sales manager, with responsibility for all sales in the United

*(Continued on page 662)*

# ANNOUNCING...

## ASPHALT COATING FOR STONE BALLAST

★ IMPROVES DRAINAGE

★ REDUCES FOULING

★ CUTS MAINTENANCE COSTS

AN EASTERN railroad's experience is typical: Because of bad drainage and fouling, track through one of its stations had to be entirely rebuilt every summer. Seven years ago it was rebuilt with a coating of *Texaco Asphalt* on the stone ballast. Since then—

The track has stayed in excellent shape—needing only minor repairs. Line and surface are still good, water sheds off quickly, and the asphalt sealcoat keeps dirt out of the ballast. Furthermore, there has been no heaving during the winters.

There are other reasons why *Texaco Asphalt* makes an ideal coating for stone ballast. It does not become brittle and "gives" under traffic without cracking. You can tamp it down, even after long service. It's easy to use—not expensive. And you can't buy a better asphalt.

*For 40 years, more and more miles of America's streets and highways have been built and maintained with Texaco Asphalt.*

Find out how *Texaco Asphalt* can help you reduce the cost of track maintenance. Call the nearest Railway Sales Division Office listed below, or write The Texas Company, *Railway Sales Division,* 135 East 42nd Street, New York 17, N. Y.

NEW YORK ★ CHICAGO ★ SAN FRANCISCO ★ ST. PAUL ★ ST. LOUIS ★ ATLANTA

TEXACO

# TEXACO Asphalt for Coating Ballast

TUNE IN THE TEXACO STAR THEATRE EVERY SUNDAY NIGHT STARRING JAMES MELTON WITH HIS GUEST, ED WYNN—CBS

New River Gorge on the C&O

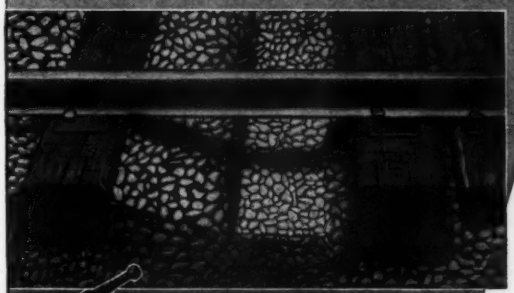
# HEADFREE JOINTS

## Lowest Cost per Unit of Strength

THE RAIL JOINT COMPANY Inc.
50 CHURCH ST. NEW YORK 7, N. Y.

# *It sure pays to know the difference*

## BETWEEN TIE TAMPING and BALLAST PLACEMENT!



Conclusive proof of the superior tie foundation obtained with JACKSON Tampers may be had by moving a tamped tie sideways to expose the bed — a demonstration JACKSON Field Engineers are glad to make.

The JACKSON M-2 Power Plant — one of several models equipped with the new trouble-free, no-maintenance, permanent magnet generators. Capacities: 1.25 to 5.0 K.V.A. (Continuous duty), single phase and 3 phase, 115 Volt, 60 Cycle A.C., to operate 2, 4, 8 or 12 tampers or B&B tools to full rated capacity.

Since the early beginnings of railroad history, tucking ballast beneath ties has been known as tie tamping. And that's why we're prone to call our JACKSON ballast placing equipment, "JACKSON Tie Tampers." But there's a vast difference in the ordinary tamped job and the results obtained with JACKSON Tampers. In the first, ballast is rammed home beneath the tie until the opening will take no more. There can be no assurance, however, that pieces haven't jammed at odd angles or that no open spaces exist. And when that occurs the tie bed won't long remain firm.

On the other hand, the unique, powerful, vibratory action of JACKSON tampers with their sidewise, forward and fluttering action, shuffles the ballast around until the pieces are tightly fitted together into a closely integrated, very firmly compacted unit of mortarless masonry. This assures a tie-bearing that is almost as smooth as a mosaic floor and one that is bound to remain firm for a long, long time; thus eliminating much future maintenance work.

Furthermore, in any ballast and in any lift, JACKSON Tampers with their interchangeable blades, will do the job quicker as well as better. Let us give you complete details of the JACKSON method of ballast placement with JACKSON Tampers and their always dependable teammates, JACKSON Portable Power Plants. Write NOW!

**JACKSON VIBRATORY TIE TAMPERS and PORTABLE POWER PLANT**

**ELECTRIC TAMPER & EQUIPMENT CO.** LUDINGTON MICHIGAN

≡WATER FLOWS INSTANTLY≡
≡AT THE PRESS OF A BUTTON≡

**with this PORTABLE SANITARY DRINKING FOUNTAIN!**

*Stop* GERM SPREADING PRACTICES!

Protect the health and strength of your workmen on jobs where *fresh, clean, cool drinking* water is not available . . . stop using unsanitary pails, kegs, dippers and cups. Save payroll losses by keeping your men on the job! This portable drinking fountain (the same as used during the war by the Armed Forces, all over the world) will help you do all this by providing protection for your workmen from disease, colds, etc. which otherwise easily spread when a "common" drinking cup or dipper is used.

Inner water container and bubbler parts made of corrosion-proof stainless steel or plated brass. Four gallon capacity tank, fully insulated to keep water *fresh* and *cool*. A few strokes with the pump supplies compressed air for instant flow of water at the press of a button. Meets requirements of Public Health Authorities!

**ORDER DIRECT FROM THE FACTORY . . . IMMEDIATE DELIVERY!**

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|---|---|
| **No. 18**—Dobbins Superbilt *Portable Drinking Fountain*, less all accessories. Only | $12.50 |
| *Salt Tablet Dispenser*, 500 tablet capacity, extra | $2.75 |
| Adjustable, Waterproof *Carrying Strap*, extra | $1.00 |
| *Spill Cup*, to catch overflow when used indoors | $3.50 |
| *Mounting Bracket*, holds fountain to wall or floor of buildings, trucks, tractors, locomotive cabs, etc. | $4.50 |

All prices F.O.B. Elkhart, Indiana. Circular on request.

Dobbins Superbilt
PORTABLE DRINKING FOUNTAIN

**DOBBINS MANUFACTURING COMPANY**
**Dept. 620**
**ELKHART, INDIANA**


States, Canada, Hawaii, and Alaska. His duties will include management of LeTourneau's eastern, central, and western sales territories, and government sales, as well as continued personal supervision of industrial sales. A photograph of Mr. Means and a sketch of his career appeared in the issue of July, 1945.

**R. G. LeTourneau, Inc.,** of Peoria, Ill., has announced the signing of three more specialized distributors under its new railroad sales and service agreement. The signing companies, the **Smith Equipment Company,** Columbia, S.C., the **Dravo-Doyle Company,** Pittsburgh, Pa., and the **Gibson - Stewart Company,** Cleveland, Ohio, are all authorized general LeTourneau distributors in their respective areas.

**Robert F. Golden** has been appointed head of the newly established research and development department of the **Eaton Manufacturing Company,** with headquarters at Massillon, Ohio. The new department will be devoted to research and development on lock washers; spring lock washers; snap, bearing, lock, and retainer rings; and other fastening devices.

**V. H. Peterson,** manager of railroad sales of the eastern division of **Fairbanks, Morse & Co.,** has been promoted to manager of the recently-combined Diesel Locomotive and Railroad divisions, with headquarters at Chicago. He succeeds

V. H. Peterson

**John W. Barriger, III,** whose election to the presidency of the Chicago, Indianapolis & Louisville is reported elsewhere in these columns. Mr. Peterson was educated at Rensselaer Polytechnic Institute, from which he was graduated with a degree in mechanical engineering in 1925. He entered the service of the Elliott Company and, in 1938, after having served as sales engineer in the Pittsburgh office and as district manager of the Rochester and Washington, D.C., offices, he went to Jeannette, Pa., as assistant to the president in co-ordinating the sales activities of the company. In 1941 he was elected a vice-president of that company, with responsibility for all sales, advertising and service activities of their three plants. In 1943 Mr. Peterson was appointed assistant to the president and manager of the New York office of the Baldwin Locomotive Works, and on April 1, 1946, he

*(Continued on page 664)*

# HOW TO MAINTAIN TRACKS

*Finished work of the ESCO wingdozer*

## *faster...at less cost ...without holding up train schedules*

ESCO track walking shoes and wingdozer is the answer.

Put them on a crawler-type tractor, and it replaces a locomotive on maintenance work—spreads ballast, skeletonizes and grades. A crew can do twice as much work with a track walking tractor and wingdozer as it can without this equipment.

Train schedules are easier to keep when an *ESCO* equipped track walking tractor is on the job. As the train approaches, the tractor gets off the track and remounts it immediately after the train passes. It's off again—back again—work again.

With the entire bottom of the tractor track in contact with the rails, the tractor can use all its power. It operates either on or off the rails.

ESCO wingdozer may be used with the following tractors: Allis-Chalmers 10
"Caterpillar" D6 and RD7
Cletrac 55
International TD18, TD14

**ASK FOR DESCRIPTIVE BOOKLET**

Detailed information on track-walking shoes and wingdozers is contained in *ESCO* booklet 153. A free copy is ready for you . . . Ask your nearest *ESCO* representative, or write us direct.

**ELECTRIC STEEL FOUNDRY** SPECIALISTS IN APPLIED METALLURGY

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*get your copy today*

THIS **NEW 20-Page** illustrated booklet shows you how 72 roads have improved their timber structures with TECO Connectors.

*Fill in coupon for your* FREE *copy.*

"TECO CONNECTORS for TIMBER CONSTRUCTION in RAILROAD SERVICE"

**TIMBER ENGINEERING COMPANY**
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Please mail my free copy—no obligation on my part.

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COMPANY.....

ADDRESS.....

.....

REM


joined Fairbanks, Morse as manager of railroad sales, eastern division.

**C. Miles Burpee** was elected a vice-president of the **Simmons-Boardman Publishing Corporation** on May 20, and has been placed in charge of advertising sales in all the corporation's railway publications, with headquarters in New York.

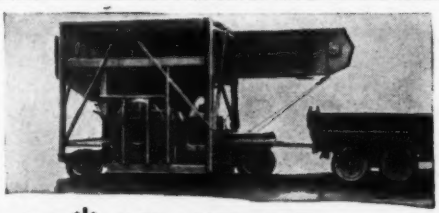
**C. Miles Burpee**

These publications include *Railway Engineering & Maintenance*, Railway Age, Railway Mechanical Engineer, Railway Signaling, and Locomotive, Car Builders, and Railway Engineering and Maintenance Cyclopedias.

Mr. Burpee was born at Edmundston, N. B., and attended the University of New Brunswick, from which he received the degrees of B. Sc. in C. E. in 1923 and M. Sc. in C. E. in 1926. His early railway experience was gained during the summers of 1918-20, when he was employed successively as assistant building inspector, ballast pit clerk, chainman, rodman and instrumentman on the Edmundston division of the Canadian National. During the summers of 1921-23, he was employed as resident engineer in charge of highway construction for the department of public works of the Province of New Brunswick.

He joined the faculty of the engineering college of Marquette University, Milwaukee, Wis., as instructor in surveying, descriptive geometry and mechanical drawing in the fall of 1923, and resigned the following year to enter the employ of the Delaware & Hudson as bridge and building supervisor of the Pennsylvania division on July 1, 1924. He was appointed track supervisor at Oneonta, N.Y., in 1925, served as acting bridge and building master at Plattsburgh, N.Y., in 1926, and in the fall of that year was appointed bridge and building supervisor in charge of building and structural work in connection with the modernization of locomotive terminal facilities and freight car construction shops at Oneonta. He was promoted to bridge and building master of the Saratoga division on January 1, 1928, and was appointed purchasing engineer, at Albany, N.Y., in 1930. In May, 1933, he was promoted to research engineer, and his duties were expanded to include the purchase and supervision of the inspection of all forest products, in addition to applied research in conjunc-

*(Continued on page 666)*

**30* CU. YD.-HR PORTABLE CONCRETE PLANT**

*Write for Data*

**CAPACITY OF PLANT**
Up to 30 cu. yd/hr depending on mixing time.

**CAPACITY OF MIXER**
Full 3/4 cu. yd. with 10% surcharge capacity.

**CAPACITY OF BIN**
20 Cu. Yd. heaped 3 equal compartments.

**CAPACITY OF AGGREMETER**
Full 3/4 cu. yd. with suspension type scale.

**CAPACITY OF ELEVATOR**
60 Tons/HR handling material weighing 100 lbs. per cu. ft.

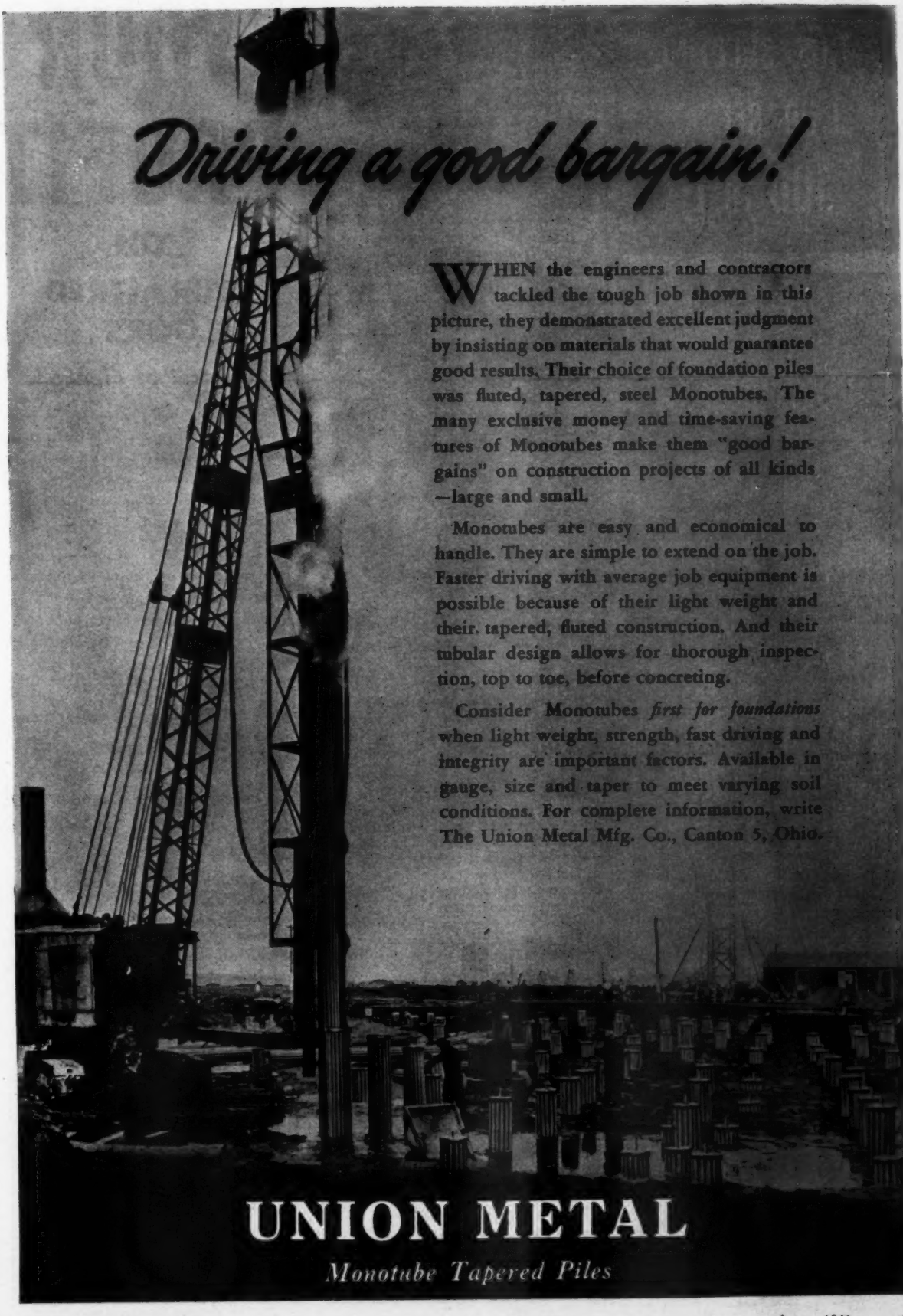
**OPERATING CONTROLS**
All Mixer Bin and AggreMeter Gates hydraulically operated with control levers banked at operator's position.

* 40 Cu. Yd/HR Plant also available.

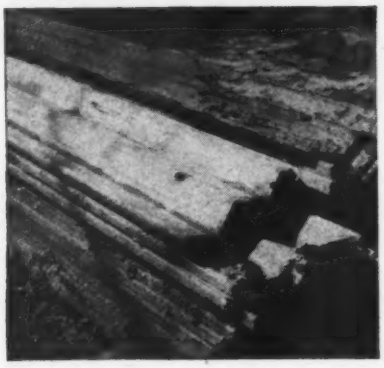
**STRAYER *Portable* CONCRETE PLANTS**

*Erie Steel Construction Co., 1166 Geist Rd., Erie, Pa.*

BUCKETS • AGGREMETERS • PORTABLE CONCRETE PLANTS


Driving a good bargain!
WHEN the engineers and contractors tackled the tough job shown in this picture, they demonstrated excellent judgment by insisting on materials that would guarantee good results. Their choice of foundation piles was fluted, tapered, steel Monotubes. The many exclusive money and time-saving features of Monotubes make them "good bargains" on construction projects of all kinds —large and small.
Monotubes are easy and economical to handle. They are simple to extend on the job. Faster driving with average job equipment is possible because of their light weight and their tapered, fluted construction. And their tubular design allows for thorough inspection, top to toe, before concreting.
Consider Monotubes *first for foundations* when light weight, strength, fast driving and integrity are important factors. Available in gauge, size and taper to meet varying soil conditions. For complete information, write The Union Metal Mfg. Co., Canton 5, Ohio.
UNION METAL
*Monotube Tapered Piles*

THIS SHEETING PAID OFF AT 100 TO 1



This extensive sewer construction job is a good example of the low over-all cost of ARMCO Steel Sheeting. The construction crews re-used it *more than 100 times*—and found it was still good for driving.

The small displacement area of ARMCO Sheeting makes it easy to drive—easy to pull. Corrugated design assures great strength yet keeps weight down to facilitate handling and speed installation. In driving, sections butt together or are held securely in place by continuous interlocking joints, assuring correct alignment and practical water-tightness.

You'll find other economies in ARMCO Sheeting for railroad construction. It is low in first cost because you buy only the exact weight you need. And since the sheeting is nestable it requires comparatively little space for shipment and storage.

Write us for prices and detailed information. Armco Drainage & Metal Products, Inc., 3005 Curtis Street, Middletown, Ohio.

ARMCO STEEL SHEETING


tion with the procurement and use of all materials and supplies.

During 1937, while on leave of absence from the D. & H., he served as vice-president in charge of the railroad division of the Chipman Chemical Company. He returned to his former position that fall, and in November, 1938, he resigned to join the Chicago staff of Simmons-Boardman as managing editor of Railway Engineering & Maintenance Cyclopedia. In August, 1943, he was appointed purchasing and stores department editor of Railway Age; in September, 1944, he was appointed editor of Railway Engineering & Maintenance Cyclopedia; and in November, 1945, was also appointed executive assistant, positions which he was holding at the time of his recent election.

Mr. Burpee has been an active member of the American Railway Engineering Association; the Purchases & Stores division of the Association of American Railroads; the American Wood-Preservers' Association, of which he is chairman of the Publications Committee and member of the Nominating committee; the American Railway Bridge & Building Association, of which he was president in 1937-38; the Railway Tie Association; and the Roadmasters' & Maintenance of Way Association, of which he is a former director.

## Obituary

**Emmanuel Woodings,** vice-chairman of the board of the Woodings Forge & Tool Company and the Woodings-Verona Tool Works, died at Pittsburgh, Pa., on May 8.

**William M. White, Sr.,** who retired in 1938 as contract manager of the New York office of the American Bridge Company, died at his home in Fanwood, N.J., on April 25.

---

**Buda Diesel All-Metal Cars**—The Buda Company, Harvey, Ill., has issued a 16-page booklet describing and illustrating a new line of all-metal rail cars that it has placed on the market. Reference is made in the booklet to the two models of official inspection cars, known as C1 and C2, which are manufactured by this company. The booklet is attractively illustrated, in part by color pictures, and includes a table of general specifications of the various cars described.


**WANTED—ASSOCIATE EDITOR**

**A young man with technical training and some experience in the engineering or maintenance of way department of a steam railway. Must demonstrate his ability to write English clearly and concisely. Editorial experience unnecessary. This position has a future for the right man. Address Railway Engineering and Maintenance, 105 W. Adams St., Chicago 3, Ill.**



# YOUR PROFIT ON DURA-TRED FLOORS . . .

## *Less Freight Breakage*

**Leading railroads practice safety-first in handling truck-train floor traffic. They keep warehouse floors, loading platforms, ramps, steps and terminal areas *smooth* and *safe* with durable Dura-Tred.**

**This tough, high-traction, wear-resistant flooring restores floors to their original smoothness and serviceability. Freight spillage and breakage are reduced to practically nothing.**

**Here's why Dura-Tred is considered "tops" by railroad floor maintenance experts.**

- **It's weather-proof.**
- **It gets smoother with use.**
- **It's impervious to anti-freeze agents.**
- **It holds traffic interference to the minimum during installation.**

**Write today for free literature and prices on Dura-Tred Flooring for patching and resurfacing.**

**DURA-TRED COMPANY**

**355 N. Central Park Blvd., Chicago 24, Ill.**

**SEND COUPON TODAY FOR SPECIAL INTRODUCTORY OFFER**

**Dura-Tred Company**
**355 N. Central Park Blvd.**
**Chicago 24, Illinois**

Gentlemen: Please send me information about Dura-Tred and your special introductory offer by return mail.

Name.....

Company.....

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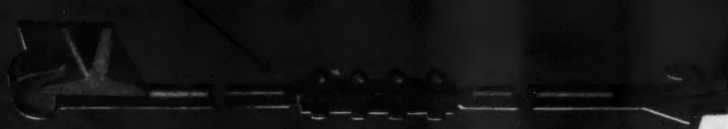
City and Zone.....State.....

# REDUCE track maintenance

# INCREASE tie life...

## with Oliver Gage Rods



YOU have less regaging and track maintenance, you gain longer tie life through reduced respiking, when you use Oliver Gage Rods to hold both rails firmly together as a single unit on curves, switches and turnouts.

Made in styles to suit the requirements of main line or yard track, Oliver Gage Rods are easy to install. They remain effective for the life of the rails.

*Get complete details from your Oliver representative.*

OLIVER
IRON AND STEEL
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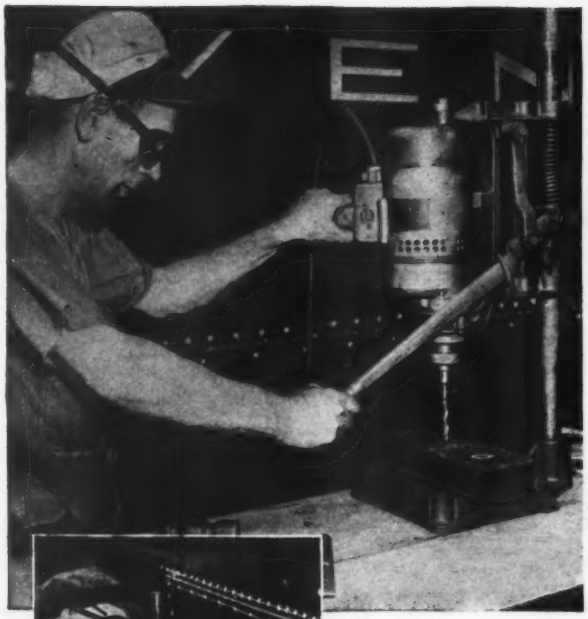


One of the numerous Stanley Portable Electric Drills in a busy maintenance shop . . . doing "double-duty" as a bench drill, set up in a Stanley 535 Bench Stand.

# QUICK CHANGE . . .
## from *PORTABLE* to a FAST and HANDY BENCH DRILL!

Outdoors . . . indoors . . . all along the line, Stanley Drills are the handiest tools in any work crew's equipment. In the shop they can be plugged into any convenient electric outlet, and in the yard they can be operated with power from a portable generator that one man can easily carry. Then, too, they're rugged, powerful and dependable . . . they won't fall down on the job. Just give them normal care and maintenance, and they'll stay on the job.

Stanley Electric Drills are made in many sizes . . . capacities from ¼" to 1" in steel. Ask for a catalog or specification sheets. Stanley Electric Tools, Division of The Stanley Works, New Britain, Connecticut.

STANLEY

**STANLEY *Electric* TOOLS**

# *WHEN YOU VISIT MODERN MEXICO CITY*

In and near Mexico City, you will find many fine, time proven Layne Well Water System installations. A partial tabulation shows Layne Well Water Systems serving Mexico City, an Automobile Assembly Plant, a large Chemical and Pharmaceutical works, Tire and Rubber Companies and extensive Irrigation Projects in the valley of Mexico adjacent to Mexico City. As in the States—and elsewhere throughout the world—these Mexico installations are giving highly efficient and exceptionally dependable service.

Layne Well Water Systems are designed and built to exceed the usual passable quality mark. Company policy has never been to allow corner cutting in quality or skillful manufacture. Such a policy has made Layne Well Water Systems world famous and given owners immeasurable satisfaction.

If you are in need of a new water system, late literature should be read very carefully. Address Layne & Bowler, Inc., General Offices, Memphis 8, Tenn.

### HIGHEST EFFICIENCY

***Layne Vertical Turbine Pumps are available in sizes to produce from 40 to 16,000 gallons of water per minute. High efficiency saves on power cost.***

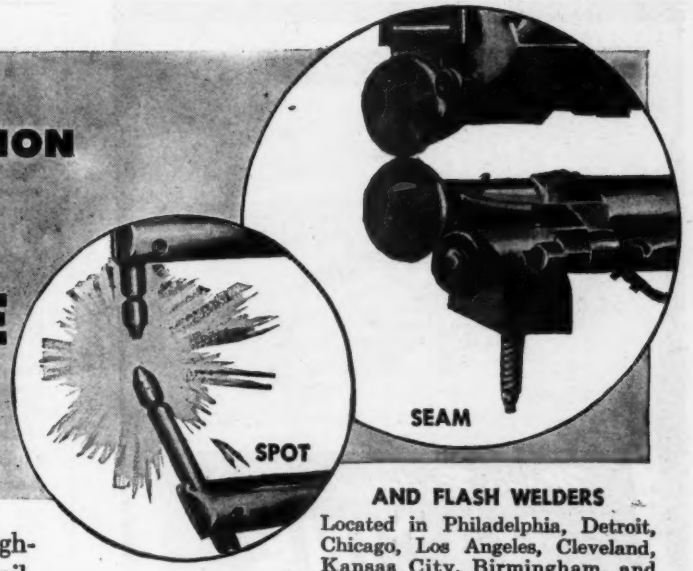
**AFFILIATED COMPANIES:** Layne-Arkansas Co., Stuttgart, Ark. ★ Layne-Atlantic Co., Norfolk, Va. ★ Layne-Central Co., Memphis, Tenn. ★ Layne-Northern Co., Mishawaka, Ind. ★ Layne-Louisiana Co., Lake Charles, La. ★ Louisiana Well Co., Monroe, La. ★ Layne-New York Co., New York City ★ Layne-Northwest Co., Milwaukee, Wis. ★ Layne-Ohio Co., Columbus, Ohio ★ Layne-Texas Co., Houston, Texas ★ Layne-Western Co., Kansas City, Mo. ★ Layne-Western Co. of Minnesota, Minneapolis, Minn. ★ International Water Supply Ltd., London, Ontario, Canada ★ Layne-Hispano Americana, S. A., Mexico, D. F.

LAYNE

**WELL WATER SYSTEMS**
**VERTICAL TURBINE PUMPS**

## FOR HIGH PRODUCTION

# SURPLUS RESISTANCE WELDERS

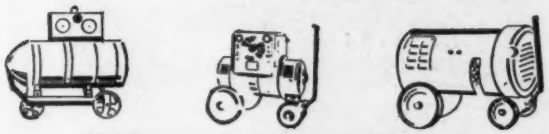



**AND FLASH WELDERS**

Located in Philadelphia, Detroit, Chicago, Los Angeles, Cleveland, Kansas City, Birmingham, and Boston for quick sale.

Now is the time to pick up modern high-production equipment at low cost. Available now, for early delivery are quantities of surplus spot, seam and butt flash welding machines—many unused or used for only short periods. True, much of the equipment was designed for special applications—but nearly all of it is readily adaptable to peacetime product needs—and such needs are being considered in pricing. Chances are that you can find just the equipment you need to modernize your operations or complete your new production plans. So contact your nearest War Assets Administration Regional Office today—write, wire or phone, or use the coupon below.

ALL ITEMS ARE SUBJECT TO PRIOR SALE!



**LINCOLN, HOBART, AND WESTINGHOUSE ARC WELDERS**
DC and AC Types; 300 to 400 amperes
DC available in large quantities.

**WELD POSITIONERS**
Many sizes and capacities including head and tailstock combinations.

**FLAME CUTTERS**
Both portable and stationary, single and multiple torch types.

**VETERANS OF WORLD WAR II:** To help you in purchasing surplus property, veterans' units have been established in each War Assets Administration Regional Office.

**FREE FACTS** TO WAR ASSETS ADMINISTRATION

Please send me information on the availability, location and condition of the following types of equipment:

- ☐ SPOT WELDERS
- ☐ SEAM WELDERS
- ☐ FLASH WELDERS
- ☐ HOBART ARC WELDERS
- ☐ WESTINGHOUSE ARC WELDERS
- ☐ WELD POSITIONERS
- ☐ LINCOLN ARC WELDERS
- ☐ ..... ARC WELDERS
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*Name*.....

*Firm*.....

*Address*.....

*City*.....*State*.....

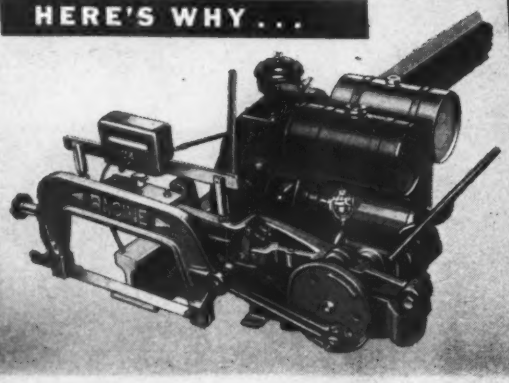
176-3

# WAR ASSETS ADMINISTRATION

**OFFICES LISTED BELOW ARE TEMPORARILY IN RECONSTRUCTION FINANCE CORPORATION AGENCIES**

Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cleveland • Dallas • Denver Detroit • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane Cincinnati • Fort Worth (Telephone 3-5381)

HERE'S WHY . . .



*Many Railroads Prefer*

**RACINE**

*High Speed Portable*

**RAIL SAWS**

**1** *They cut rails faster than any other method* — An 80 lb. rail in 5 min., 100 lb. rail in 7 min., 130 lb. in 9 min. Standard capacity for rails up to 7⅛" x 6½". Extra capacity 10" x 6½" for special Trilby rails.

**2** *They do a more accurate job* — As little as 3/10" can be cut from end of rail. Cutting results in a smooth rail face that requires no additional work.

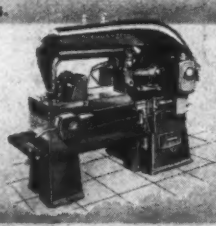
**3** *They save time and labor* — Two men can easily transport and only one man needed to operate saw. No need for heavy "on track" equipment — no traffic delays because of rail cutting.

**4** *They do a better cutting job* — No chipping, overheating or burning of grain structure. No split ends.

Racine Rail Saws are today standard maintenance equipment in the yards and shops of many leading railroads. Models are available for operation with gasoline, electric and compressed air power. Write for descriptive circular 58-A for complete details.

**RACINE METAL SAWS FOR SMALL AND LARGE SHOPS**

Investigate Racine's complete line of hydraulic metal cutting saws — with simple one lever control for all operating phases . . . for fast, accurate cutting of any metal. In capacities 6"x6" to 20"x20". Ask for Catalog No. 12. RACINE TOOL AND MACHINE COMPANY, 1738 State St., Racine, Wis.



RACINE

**RACINE**



# "Tomorrow" Means Six Months To Six Years

**"Today's planning should be based on tomorrow's business,**
and in industrial advertising, tomorrow means six months to six years." That's how an important executive sizes up the general industrial situation.
His observation applies to the railroad market precisely.

**There's a $1,200,000,000 market annually**
in the railway maintenance of way modernization programs now being shaped up. This means a lot of business for manufacturers and suppliers tomorrow.

**Today—Now—is the time for manufacturers,**
whose products the railroads need, to start building tomorrow's railroad business for themselves. Prepare today—through regular and consistent advertising in Railway Engineering and Maintenance.

**Railway Engineering and Maintenance gets**
your message to those railway executives and supervisors who make the buying decisions for roadway, track, bridge and building, and water service departments. Railway Engineering and Maintenance is effective because it thoroughly penetrates this important group:

• • • • • •

**These Railway Executives Receive and Read RAILWAY ENGINEERING & MAINTENANCE**

| GROUP | READERSHIP |
|---|---|
| Executives in Chg. Eng'g. | 96.6% |
| Chief Engineers | 98.4 |
| Chief Engineers M/W | 100.0 |
| Engineers M/W | 88.5 |
| Principal Asst. Engrs. | 100.0 |
| Assistant Engrs. | 88.0 |
| Miscellaneous Engrs. | 90.0 |
| Valuation and Office Engrs. | 94.0 |
| Distr. & Div. Engrs. | 94.0 |
| Engrs. of Track | 80.0 |
| General Roadmasters | 90.0 |
| Roadmasters | 92.0% |
| Track Supervisors | 87.0 |
| General Inspectors | 87.5 |
| Supts. Work Equip. and M/W Shops | 93.0 |
| Engrs. Struct. & Design | 98.0 |
| Supervisors B & B | 94.0 |
| Master Carpenters | 93.0 |
| Supts. Treating Plants | 90.0 |
| Water Service Engrs., Supts., Etc. | 98.0 |
| TOTAL | 93.2% |

• • • • • •

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**PUBLISHING CORPORATION**

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# BEALL Hi-Duty SPRING WASHERS

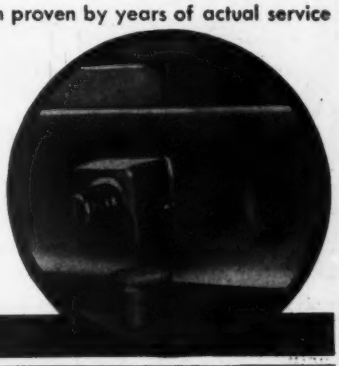
BEALL Hi-Duty SPRING WASHERS are made especially to stand the strain of the heavy-duty rail service required by today's high-speed freight and passenger trains.

We control every step of their manufacture — from the specification of the specially-developed formula and process used in making the steel to the forming, hardening, tempering and testing operations.

Their dependability has been proven by years of actual service on hundreds of railroads.

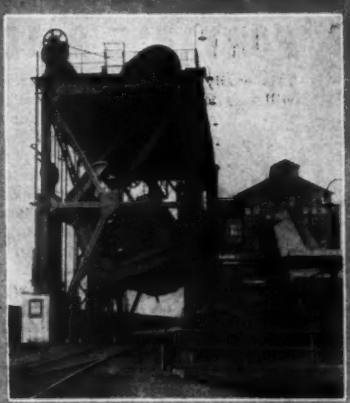
## *made especially for Railroad Service*

BEALL HI-DUTY SPRING WASHERS, being made especially for railroad service are strong and tough, yet provide the necessary "springing action" required at rail joints, frogs and crossings.



**BEALL TOOL DIVISION** (HUBBARD & CO.)
140 Shamrock St., EAST ALTON, ILL.
*SPECIALIST MANUFACTURERS OF SPRING WASHERS*

## HANDLE MATERIALS FASTER, EASIER WITH THE NEW I.B. LOCOMOTIVE CRANE



Important new engineering features in I.B. Locomotive Cranes assure easier handling of capacity loads with greater all-around efficiency. Air-operated controls respond sensitively and are within quick, easy reach of operator. Anti-friction bearings at all essential points reduce maintenance to a minimum. Rotating and travel friction disc clutches with one-point adjustment minimize wear and strain on mechanism. One-piece cast steel bed insures longer life. Monitor-type cab allows operator 360° visibility. Write for complete information.

I.B. makes a complete line of heavy-duty materials handling equipment, including the turnover dumper (above right) that electrically lifts and dumps 100-ton coal cars like toys.

## INDUSTRIAL BROWNHOIST BUILDS BETTER CRANES

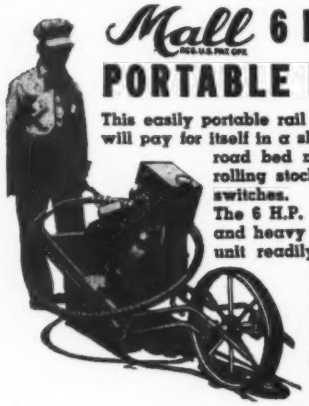
INDUSTRIAL BROWNHOIST CORP. • BAY CITY, MICH. • District Offices: New York, Philadelphia, Cleveland, Chicago • Agencies: Detroit, Birmingham, Houston, Denver, Los Angeles, San Francisco, Seattle, Vancouver, B.C., Winnipeg, Canadian Brownhoist Ltd., Montreal, Quebec.

# SQUARE A 12x12 in 10 Seconds

## with a Mall CHAIN SAW

*Mall Gasoline Engine Chain Saw available in many cutting capacities.*

**Heavy timbers and piling used in the construction of bridges, docks, trestles and large industrial buildings can be squared to size in a few seconds with a Mall Gasoline Engine Chain Saw. Use this simple-to-operate power saw right on the job—it is easy to handle and readily portable. Has stall-proof clutch, handle throttle and automatic oiling system. Cutting chain swivels for horizontal, vertical or any angle cut. Pneumatic and Electric models are available. Also Electric Chain Sharpeners.**



## Mall 6 H. P. Off-the-Track PORTABLE RAIL GRINDER

**This easily portable rail grinder, with pneumatic wheel, will pay for itself in a short time in savings on rail and road bed maintenance, reduced shock on rolling stock, and better acting and fitting switches.**

**The 6 H.P. variable speed gasoline engine and heavy duty flexible shafting make the unit readily adaptable to rail joint, frog, crossing, and switch point grinding. Engine starts easily, requires little attention and uses very little fuel. Unit is ruggedly constructed for long, hard usage. Patented slip-lock detail on spindles and various attachments reduces tool changing to a minimum.**

***Now equipped with pneumatic wheel***

***Other MALL Portable Power Tools include: Cross Slotters, Rail Grinders, Gasoline Engine, Pneumatic and Electric Concrete Vibrators and Surfacers, ¼" and ½" Electric Drills, Flexible Shaft Machines with attachments for sanding, grinding, polishing, wire brushing, buffing and drilling. Write for complete catalog to***

**Railroad Department**

**MALL TOOL COMPANY**

**7746 South Chicago Ave. Chicago 19, Ill.**

**★ 25 Years of "Better Tools For Better Work."**

**Mall PORTABLE POWER TOOLS**

# Creosoted { PILING POLES TIMBERS TIES

**TREATED BY**

**McCORMICK & BAXTER CREOSOTING CO.**

PORTLAND STOCKTON

M CREO-FIR B

## Poles

## WITH A LONG CLEAN LIFE!

**STRAIGHT STRONG DURABLE DOUGLAS FIR**

Pressure creosoting at McCormick & Baxter means a deep, uniform penetration of the preservative — long-lifed poles resistant to decay and termites.

Following the pressure treatment McCormick & Baxture vacuum-dries the poles, so you get them neat and clean... easy to handle.

Give us a call when you need treated poles, piling, timbers or ties. *We deliver!*

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*TREATING PLANTS:*

STOCKTON, CALIFORNIA • PORTLAND, OREGON

## . . . with Inland 4-Way Floor Plate

Any step by an employee that results in a slip or fall has its effect on your profit. The most important movement in your plant is—Production Steps! Steps that must be protected.

Farsighted management looks to Inland 4-Way Floor Plate, relies on it, to safeguard those Production Steps . . . it's the sturdy, faithful guardian of the men who "man" the production line.

Inland's safety floor plate, with its four-way lug, provides a sure grip traction for foot and wheel on floors, walkways, ramps, platforms and steps—any place where accidents could occur.

Made of hot rolled steel, Inland 4-Way Floor Plate practically eliminates maintenance — it won't burn, warp, crack, splinter or absorb liquids and odors. Easily installed and the essence of economy—once placed, Inland 4-Way Floor Plate is there to *stay!* Write today for your copy of the Inland 4-Way Floor Plate catalogue!

**Inland Steel Company, 38 South Dearborn Street, Chicago 3, Illinois. Sales Offices: Cincinnati, Detroit, Indianapolis, Kansas City, Milwaukee, New York, St. Louis, St. Paul.**

# INLAND STEEL CO.

**OTHER PRODUCTS: BARS • STRUCTURALS • PLATES • SHEETS • STRIP • TIN PLATE • PILING • REINFORCING BARS • RAILS • TRACK ACCESSORIES**

## ANY JOB— ANYWHERE

With bucket, hook, magnet, dragline or rail tongs, the Burro is ready to handle any job—anywhere. Burro's fast travel speeds permit it to get out on the job without delay—in addition, heavy draw bar pull permits Burro to haul its own work gang or cars of equipment, often eliminating need for a work train or locomotive. Designed for railroad work—and built to stand the punishment of hard, year after year use on any job, anywhere they are needed, Burro cranes are the busiest machines on the railroad. Only Burros have all these features:

- **Fast Travel speeds**—Draw Bar Pull up to 7500 lbs.
- **Elevated Boom Heels**—for working over high sided gondolas
- **Low overall height**—Burro can be moved and worked on a standard 46 foot flat car
- **Short Tail Swing**—increases crane operation—will not foul adjoining track
- **Wide operating range**—can be used with clamshell bucket, rail tongs, hook, magnet or dragline

**CULLEN-FRIESTEDT CO.**

**1301 S. Kilbourn Ave. Chicago 23, Ill.**

# HERE today.... THERE tomorrow!

One of the advantages of standard ARMCO STEELOX Buildings that appeals to maintenance men is *easy portability.*

Prefabricated STEELOX panels can be salvaged 100 per cent — quickly moved from one location to another. They save time and money all along the line because an inexperienced crew of four men can assemble a 12′ x 24′ building in 10 hours.

STEELOX tool houses or bunk houses have all the advantages of a permanent structure — long life and low upkeep — plus easy portability should conditions change.

STEELOX Buildings are adaptable to many requirements. They can be quickly wired, easily insulated, or may be left uninsulated without affecting weather-tightness. All-steel construction is an excellent fire-barrier, while interlocking joints help keep out dust and vermin. The galvanized PAINTGRIP surface of STEELOX can be painted immediately — assures long paint life.

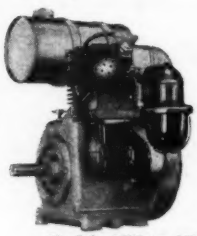
Get prices and the complete story of ARMCO STEELOX Buildings. Write Armco Drainage & Metal Products, Inc., 3095 Curtis Street, Middletown, Ohio.

**STEELOX BUILDINGS**

ARMCO

# *Multiply the* PRODUCTIVE CAPACITY *of* MEN *and* EQUIPMENT with WISCONSIN HEAVY-DUTY *Air-Cooled* ENGINE POWER...

**During these difficult days of equipment shortages and overburdened railway operating and maintenance schedules, Wisconsin Heavy-Duty Air-Cooled Engines . . . and all types of Wisconsin-powered auxiliary equipment . . . rate top preference among men who place a premium on "productive capacity". There is no substitute for heavy-duty dependability and hard-slugging serviceability.**

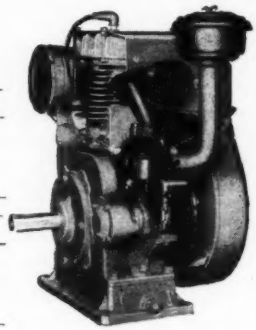


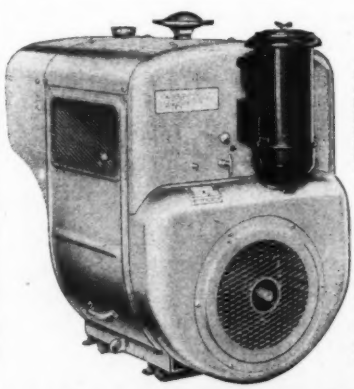
**Model AB, AK Series**
***4-cycle, single cylinder***

| SPECIFICATIONS: | AB | AK |
|---|---|---|
| Bore | 2½" | 2⅞" |
| Stroke | 2¾" | 2¾" |
| Cu. In. Displ. | 13.5 | 17.8 |
| Hp. Range | 2-3 | 3-4 |
| Weight | 76 lbs. | 77 lbs. |

**Models AEH to AHH Series**
***4-cycle, single cylinder***

| SPECIFICATIONS: | AEH | AFH | AGH | AHH |
|---|---|---|---|---|
| Bore | 3" | 3¼" | 3½" | 3⅝" |
| Stroke | 3¼" | 4" | 4" | 4" |
| Cu. In. Displ. | 23 | 38.2 | 38.5 | 41.3 |
| Hp. Range | 4-6 | 5-7 | 6-8.5 | 7-9 |
| Weight | 130 lbs. | 170 lbs. | 175 lbs. | 180 lbs. |





**Models VE4 to VP4 Series**
***4-cylinder, V-type***

| SPECIFICATIONS: | VE-4 | VM-4 | VP-4 |
|---|---|---|---|
| Bore | 3" | 3¼" | 3½" |
| Stroke | 3¼" | 4" | 4" |
| Cu. In. Displ. | 91.9 | 132.7 | 154 |
| Hp. Range | 13-22 | 20-28 | 23-31 |
| Weight | 295 lbs. | 418 lbs. | 418 lbs. |

***Let us put you in touch with the nearest Wisconsin Engine distributor and write for detailed data.***

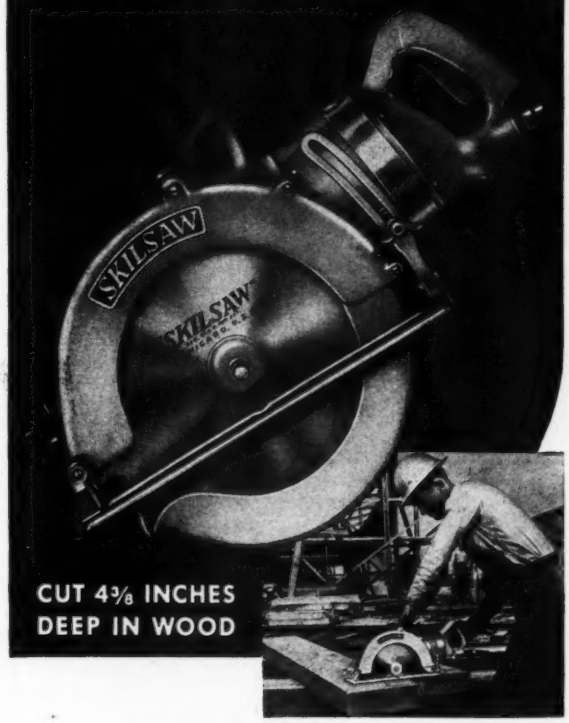
Most H.P. per pound

**WISCONSIN MOTOR Corporation**
MILWAUKEE 14, WISCONSIN, U. S. A.
*World's Largest Builders of Heavy-Duty Air-Cooled Engines*

# IMMEDIATE DELIVERY

*on Powerful, Fast-cutting*

## PNEUMATIC SKILSAWS!

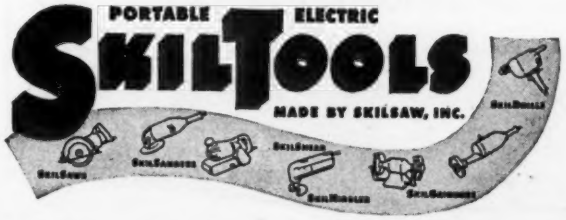



CUT 4⅜ INCHES DEEP IN WOOD

• Pneumatic SKILSAW operates efficiently anywhere you have an 80 to 100 lb. air pressure line . . . cuts fast through flooring and bracing for freight cars . . . speeds bridge and trestle building, station and warehouse repairs. Outstanding safety is provided by leak-proof poppet-type throttle valve which cuts air off instantly when closed. Positive safety lock prevents accidental starting. Telescoping guard shields blade. Call your distributor today for a demonstration!

**SKILSAW, INC.**
5033-43 Elston Ave., Chicago 30, Ill.
*Factory Branches in All Principal Cities*

PORTABLE ELECTRIC
**SKILTOOLS**
MADE BY SKILSAW, INC.



# You can profit by our EXPERIENCE in building

ONLY with Briggs & Stratton 4-cycle engines can you profit by the skill and experience of an organization which has built 2½ Million air-cooled engines. *Their record of dependable performance* through the years is your assurance that "it's powered right when it's powered by Briggs & Stratton"—a factor of utmost importance to every user, dealer and manufacturer of gasoline powered appliances, farm machinery or industrial equipment.

**BRIGGS & STRATTON CORPORATION**
Milwaukee 1, Wisconsin

4 CYCLE
BRIGGS & STRATTON
GASOLINE ENGINES

*Air-Cooled Power*

# Electricity

## FOR RAILROAD WORK *Anywhere!*

Capacity range: 350 to 35,000 watts; 115 to 660 volts A.C., 50 to 800 cycles; 6 to 600 volts D.C.; combination A.C.—D.C. types.

Onan

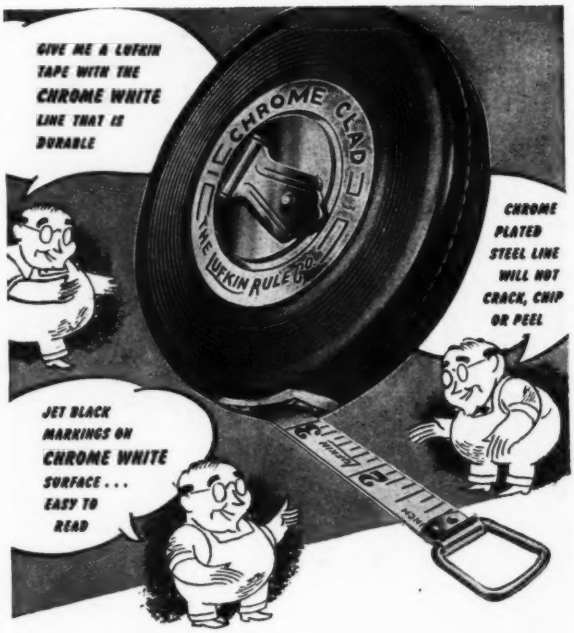
Onan Electric Generating Plants provide sure, on-the-spot electric power to meet many situations and applications in the Railroad Industry. Indispensable for maintenance work, signal systems, service and general lighting, repair shops, emergencies and other uses.

Driven by Onan-built, 4-cycle gasoline engines, these power plants are of single-unit, compact design and sturdy construction. They are suitable for intermittent or heavy duty, continuous service.

Model shown is from W3S series; 2000 to 3500 watts; powered by Onan two-cylinder, water-cooled engine.

**D. W. ONAN AND SONS**
4415 ROYALSTON AVE.
MINNEAPOLIS 5, MINN.

*Write For Folder 690 describing complete Onan Line*


GIVE ME A LUFKIN TAPE WITH THE CHROME WHITE LINE THAT IS DURABLE
CHROME CLAD
THE LUFKIN RULE CO.
CHROME PLATED STEEL LINE WILL NOT CRACK, CHIP OR PEEL
JET BLACK MARKINGS ON CHROME WHITE SURFACE . . . EASY TO READ

LUFKIN

For general measuring. Rust-resistant line will not crack, chip or peel —jet black markings are durable. Available with hook ring. Buy from your dealer. Write for free catalog.

**THE LUFKIN RULE CO., SAGINAW, MICHIGAN, New York City**

## 100% Self-Contained

SYNTRON

Gasoline Hammer

# PAVING BREAKERS

BUST Concrete
CUT Asphalt
DIG Clay and Shale
TAMP Backfill
DRIVE Spikes

**A sturdily-built, hard-hitting hammer that will save time for your Section Crews, and money and labor for you.**

*Write for descriptive literature*

**SYNTRON CO.**
290 Lexington, Homer City, Pa.

THAT'S SYNTRON

# NUROOF

AMERICA'S No. 1 Roof Saver

A few railroad orders for Nuroof taken from our files are herewith represented by their emblems. Here are some of the nation's great railroads and it is with pride we serve them.

Nuroof is an outstanding waterproofer. Its safe, cold application and fire retardent properties make it especially suitable for railroad use. Applied by unskilled labor over old roofing, Nuroof provides a new roof at a minimum of cost. Guaranteed for 10 years.

*For Further Details Write - - -*

New York Central Serves THE RAILROADS

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CHICAGO MILWAUKEE ST. PAUL AND PACIFIC

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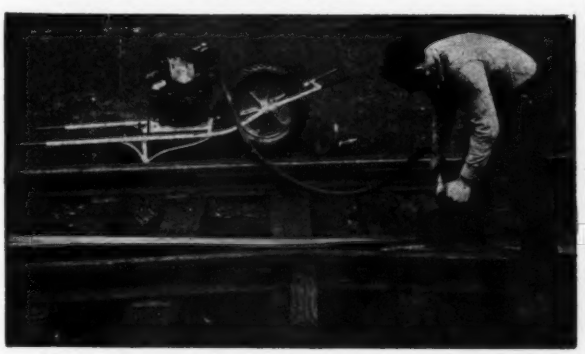

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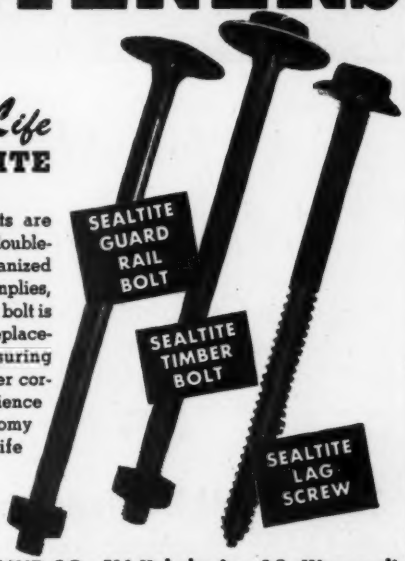


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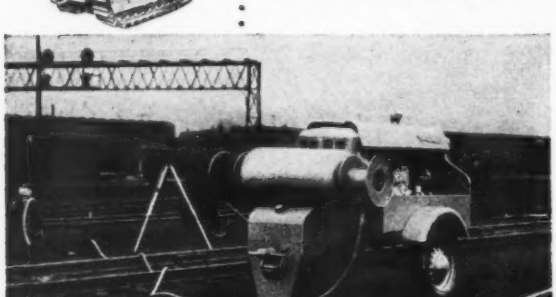

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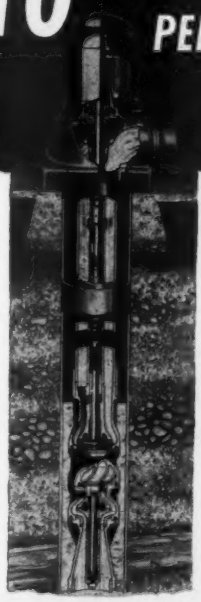

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WALTER J. RILEY, *President*

EAST CHICAGO, INDIANA

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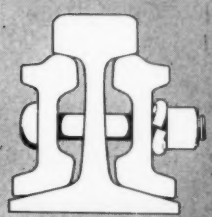

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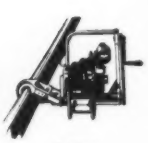

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